

**SAN BERNARDINO COUNTY  
MOJAVE NARROWS REGIONAL PARK  
Barn and Corral Renovation**

**18000 YATES ROAD  
Victorville, CA 92392**

PROJECT # 10.10.1424

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

ELECTRICAL/PLUMBING ENGINEER  
DESIGN WEST ENGINEERING  
412 E. Vanderbilt Way  
SAN BERNARDINO, CA 92408  
909.890.3700

CIVIL ENGINEER  
ERSC INC.  
Matt Brudin  
1861 W. Redlands Blvd.  
Redlands, CA 92373  
Phone: (909) 890-1255

<b>DIVISION</b>	<b>SECTION</b>	<b>TITLE</b>
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	00 3100	Available Project Information
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	01 3000	Administrative Requirements
	01 3114	Facility Services Coordination
	01 4000	Quality Requirements
	01 4200	Reference Standards and Definitions
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DIVISION	SECTION	TITLE
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	32 3110	Pipe Fences and Gates

NOT FOR BID

**SECTION 00 3100  
AVAILABLE PROJECT INFORMATION**

**PART 1 GENERAL**

**1.01 EXISTING CONDITIONS**

- A. Certain information relating to existing surface and subsurface conditions and structures is available to bidders but will not be part of Contract Documents, as follows:
- B. Certain information relating to existing surface and subsurface conditions and structures is available to bidders as follows:
- C. Geotechnical Report: Entitled Geotechnical Investigation-Mojave Barn and Corrals Revitalization Project - prepared by Inland Foundation Engineering, Inc. Project No. S168-183, dated December 11, 2023. Geotechnical Report Addendum-Dated Dec. 20, 2023.
  - 1. Original copy is available for inspection with the project specifications, Appendix A.
  - 2. This report identifies properties of below grade conditions and offers recommendations for the design of foundations, prepared primarily for the use of Architect.
  - 3. The recommendations described shall not be construed as a requirement of this Contract, unless specifically referenced in Contract Documents.
  - 4. This report, by its nature, cannot reveal all conditions that exist on the site. Should subsurface conditions be found to vary substantially from this report, changes in the design and construction of foundations will be made, with resulting credits or expenditures to the Contract Price accruing to Owner.

**PART 2 PRODUCTS (NOT USED)**

**PART 3 EXECUTION (NOT USED)**

**3.01 OBTAINMENT OF PERMITS**

- A. Contractor to obtain the following required permits, at no cost to Owner:
- B. Building Permit Procedures: When required to obtain this permit:
  - 1. Complete and file permit application(s) with appropriate agency.

**END OF SECTION**

**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. Product Data.
  - 3. Samples.
- 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. 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 4500 - "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 be 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 one (1) 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 one (1) 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.

**1.04 CONTRACTOR'S CONSTRUCTION SCHEDULE**

- A. Submit five (5) copies of the Construction Schedule, broken down by trade and activity, to the Owner for approval. Schedule shall be by CPM, 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 Owner no later than 5 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 5 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 SAFETY AND HEALTH PROGRAM**

- A. Provide a Health and Safety Plan per local agency requirements.

#### **1.06 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 5 days of the date required for submittal of the Contractor's Construction Schedule.

#### **1.07 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 General Contractor will be billed \$215/hour for review time.

#### **1.08 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 77 00 - "Closeout Procedures".

#### **1.09 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

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.

#### **1.10 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.

#### **1.11 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's Representative and Architect at on a weekly basis.
  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**

**2.01 -- NOT APPLICABLE --**

#### **PART 3 EXECUTION**

**3.01 -- NOT APPLICABLE --**

**END OF SECTION 01 30 00**

**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 77 00 - "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.
  - 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.
  - 6.

## **PART 2 PRODUCTS**

### **2.01 -- NOT APPLICABLE --**

### **2.02**

## **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.
  17. Misalignment.
  18. Excessive weathering.
  19. Unprotected storage.
  20. Improper shipping or handling.

- 21. Theft.
- 22. Vandalism.

**END OF SECTION 01 31 00**

**NOT FOR BID**

**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 Special 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 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.
    - 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 Contract 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.
  - 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.

- F.
- G. AAAluminum Association
- H. AABCAssociated Air Balance Council
- I. AAMAAmerican Architectural Manufacturers Association
- J. AASHTOAmerican Association of State Highway and Transportation Officials
- K. ACIAmerican Concrete Institute International
- L. ADCAmerican Diffusion Council
- M. AGAAmerican Gas Association
- N. AIAAmerican Institute of Architects
- O. AISCAmerican Institute of Steel Construction
- P. AISIAmerican Iron and Steel Institute
- Q. ALSCAmerican Lumber Standards Committee
- R. AMCAAir Movement and Control Association International
- S. ANSIAmerican National Standards Institute
- T. APAEngineered Wood Association (Formerly American Plywood Ass'n)
- U. ARIAir Conditioning and Refrigeration Institute
- V. ASCEAmerican Society of Civil Engineers
- W. ASHRAEAmerican Society of Heating, Refrigerating and Air Conditioning Engrs
- X. ASMEThe American Society of Mechanical Engineers
- Y. ASPEAmerican Society of Plumbing Engineers
- Z. ASSEThe American Society of Sanitary Engineers
- AA. ASTMAmerican Society for Testing and Materials
- BB. AWIArchitectural Woodwork Institute
- CC. AWSAmerican Welding Society
- DD. BHMABuilders Hardware Manufacturers Association
- EE. BIABrick Industry Association
- FF. CISCACeilings & Interior Systems Construction Association
- GG. CISPICast Iron Soil Pipe Institute
- HH. CLFMICChain Link Fence Manufacturers Institute
- II. CRSIConcrete Reinforcing Steel Institute
- JJ. DHIDoor and Hardware Institute (Formerly Ntl. Builders Hardware Assoc)
- KK. EIMAEIFS Industry Manufacturers Association
- LL. FGMAFlat Glass Marketing Association
- MM. FMFactory Mutual Research Corporation
- NN. GAGypsum Association
- OO. GANAGlass Association of North America
- PP. IAPMOInternational Association of Plumbing and Mechanical Officials
- QQ. ICBOInternational Conference of Building Officials
- RR. ICCInternational Code Council
- SS. IEEEInstitute of Electrical and Electronics Engineers

- TT. IESNA Illuminating Engineering Society of North America  
 UU. IGCC Insulating Glass Certification Council  
 VV. MBMA Metal Building Manufacturers Association  
 WW. NAAMM The National Association of Architectural Metal Manufacturers  
 XX. NCMANational Concrete Masonry Association  
 YY. NEBBNational Environmental Balancing Bureau  
 ZZ. NECANational Electrical Contractors Association  
 AAA. NEMANational Electrical Manufacturers Association  
 BBB. NETANational Electrical Contractors Association  
 CCC. NFPA National Fire Protection Association  
 DDD. NRCANational Roofing Contractors Association  
 EEE. NSFNSF International (National Sanitation Foundation)  
 FFF. PCAPortland Cement Association  
 GGG. PDIPlumbing and Drainage Institute  
 HHH. SDISteel Door Institute  
 III. SGCCSafety Glazing Certification Council  
 JJJ. SJISteel Joist Institute  
 KKK. SMACNASheet Metal and Air Conditioning Contractors' National Association  
 LLL. TCATile Council of America  
 MMM. UBCUniform Building Code (International Conference of Building Officials)  
 NNN. ULUnderwriters Laboratories, Inc.  
 OOO. WCLIBWest Coast Lumber Inspection Bureau  
 PPP. WDMAWindow and Door Manufacturers Association (Formerly NWWDA)  
 QQQ. WI Woodwork Institute  
 RRR. 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.
- SSS.  
 TTT. ADAAmericans with Disabilities Act  
 UUU. CFRCode of Federal Regulations  
 VVV. COECorps of Engineers, U S Army  
 WWW. CPSCConsumer Product Safety Commission  
 XXX. DOCDepartment of Commerce  
 YYY. DOTDepartment of Transportation  
 ZZZ. EPAEnvironmental Protection Agency  
 AAAA. FAAFederal Aviation Administration  
 BBBB. FCCFederal Communications Commission  
 CCCC. FDAFood and Drug Administration  
 DDDD. FHAFederal Housing Administration  
 EEEE. FSFederal Specifications and Standards (General Services Admin)

- FFFF. GSAGeneral Services Administration
- GGGG. MILMilitary Specifications and Standards (U S Dept of Defense)
- HHHH. NISTNational Institute of Standards and Technology
- IIII. OSHAOccupational Safety and Health Administration (U S Dept of Labor)
- JJJJ. PSPProduct Standards (U S Dept of Commerce)
- KKKK. USDAUnited States Department of Agriculture
- LLLL. USPSUnited States Postal Service
- MMMM.

**PART 2 PRODUCTS**

**2.01 -- NOT APPLICABLE --**

**2.02**

**PART 3 EXECUTION**

**3.01 -- NOT APPLICABLE --**

**END OF SECTION 01 42 00**

**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 at 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.

- 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.
- F. Owner reserves the right to employ an Independent Testing agency at any time.

### 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 as 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.

2.

## **PART 2 PRODUCTS**

### **2.01 -- NOT APPLICABLE --**

### **2.02**

## **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.
- C. Protect construction exposed by or for quality-control service activities, and protect repaired construction.
- D. Repair and protection is Contractor's responsibility, regardless of the assignment of responsibility for inspection, testing or similar services.
- E. Should manufacturer's instructions conflict with Contract Documents, request clarification from Architect before proceeding.
- F. 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.
- G. Have work performed by persons qualified to produce required and specified quality.
- H. Verify that field measurements are as indicated on Shop Drawings or and instructed by the manufacturer.
- I. 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 01 45 00**

**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 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; 2021.
- B. ASTM D4491/D4491M - Standard Test Methods for Water Permeability of Geotextiles by Permittivity; 2022.
- C. ASTM D4491 - Standard Test Methods for Water Permeability of Geotextiles by Permittivity.; 1999a (Reapproved 2014).
- D. ASTM D4533/D4533M - Standard Test Method for Trapezoid Tearing Strength of Geotextiles; 2015 (Reapproved 2023).
- E. ASTM D4632/D4632M - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles; 2015a (Reapproved 2023).
- F. ASTM D4751 - Standard Test Methods for Determining Apparent Opening Size of a Geotextile; 2021a.

**1.03 PERFORMANCE REQUIREMENTS**

- A. Coordinate work of this section with Owner-provided "Storm Water Pollution Prevention Plan (SWPPP) if required by local enforcement agency.
  - 1. Where requirements of both plans are in conflict, comply with the SWPPP.
  - 2. SWPPP Plan not required if disturbed area is less than 1 acre.
- B. Develop and follow an Erosion and Sedimentation Prevention Plan and submit periodic inspection reports.
- C. 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.
- 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.
  - 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.

#### 1.04 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.
- 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<sup>-1</sup>, 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/D4533M.
  - 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.
  - 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 01 57 13**

**SECTION 01 6000  
PRODUCT REQUIREMENTS**

**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Products
- B. Re-use of existing products.
- C. Transportation and handling.
- D. Storage and protection.
- E. Product options.
- F. 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.
- G. Provide equipment and personnel to store Products by methods to prevent soiling, disfigurement, or damage.
- H. 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.

**1.06 SUBSTITUTIONS**

- A. Architect/Engineer will consider requests for Substitutions only within 30 days after date of Owner Contractor Agreement.
- B. Substitutions may be considered when a product becomes unavailable through no fault of the Contractor.
- 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.
  - 4.

**PART 2 PRODUCTS****EXISTING PRODUCTS**

- A. Reused Products: Reused products include materials and equipment previously used in this or other construction, salvaged and refurbished as specified.
- B. Specific Products to be Reused: The reuse of certain materials and equipment already existing on the project site is encouraged.

**PART 3 EXECUTION****-- NOT APPLICABLE --****END OF SECTION 01 60 00**

**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. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.
- H. General requirements for maintenance service.

**1.02 RELATED REQUIREMENTS**

- A. Section 01 3000 - Submittals: Submittal procedures.
- B. Section 01 45 00 - Quality Control: Testing and inspection procedures.
- C. Section 01 5713 - Temporary Erosion Control: Additional erosion and sedimentation control requirements.
- D. Section 01 7419 - Construction Waste Management and Disposal: Additional procedures for trash/waste removal, recycling, salvage, and reuse.
- E. Section 01 7800 - Closeout Submittals: Project record documents, operation and maintenance data, warranties.
- F. 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.

**1.04 QUALIFICATIONS**

- A. For demolition work, employ a firm specializing in the type of work required.
  - 1. Minimum of 5 years of documented experience.

**1.05 PROJECT CONDITIONS**

- A. Use of explosives is not permitted.
- B. Grade site to drain. Maintain excavations free of water.
- C. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
- D. 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.
- E. Erosion and Sediment Control: Plan and execute work by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.
- F. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.

**1.06 COORDINATION**

- A. Coordinate scheduling, submittals, and requirements of Section 01 30 00 - "Coordination" to ensure efficient and orderly sequence of installation of interdependent construction elements,

with provisions for accommodating items installed later.

- 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. Coordinate completion and clean-up of work of separate sections.
- F. 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.
- G.

## **PART 2 PRODUCTS**

### **2.01 -- NOT APPLICABLE --**

### **2.02**

## **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. Owner will locate and protect survey control and reference points.
- D. Control datum for survey is that established by Owner provided survey.
- E. Protect survey control points prior to starting site work; preserve permanent reference points during construction.
- F. Promptly report to Architect the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.
- G. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect.
- H. Utilize recognized engineering survey practices.
- I. 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.

### 3.05 GENERAL INSTALLATION REQUIREMENTS

- A. In addition to compliance with regulatory requirements, conduct construction operations in compliance with NFPA 241, including applicable recommendations in Appendix A.
- B. 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.
- C. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.
- D. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.
- E. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.
- F. Make neat transitions between different surfaces, maintaining texture and appearance.
- G.

### 3.06 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 alterations work constitutes acceptance of existing conditions.
- B. Remove existing work as indicated and as required to accomplish new work.
  - 1. Remove items indicated on drawings.
  - 2. Relocate items indicated on drawings.
  - 3. Where new surface finishes are to be applied to existing work, perform removals, patch, and prepare existing surfaces as required to receive new finish; remove existing finish if necessary for successful application of new finish.
  - 4. Where new surface finishes are not specified or indicated, patch holes and damaged surfaces to match adjacent finished surfaces as closely as possible.
- C. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove, relocate, and extend existing systems to accommodate new construction.
  - 1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components; if necessary, modify installation to allow access or provide access panel.
  - 2. Where existing systems or equipment are not active and Contract Documents require reactivation, put back into operational condition; repair supply, distribution, and equipment as required.

3. 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.
    - a. Disable existing systems only to make switchovers and connections; minimize duration of outages.
    - b. Provide temporary connections as required to maintain existing systems in service.
  4. Verify that abandoned services serve only abandoned facilities.
  5. Remove abandoned pipe, ducts, conduits, and equipment; remove back to source of supply where possible, otherwise cap stub and tag with identification; patch holes left by removal using materials specified for new construction.
- D. Patching: Where the existing surface is not indicated to be refinished, patch to match the surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.
- E. Refinish existing surfaces as indicated:
1. Where rooms or spaces are indicated to be refinished, refinish all visible existing surfaces to remain to the specified condition for each material, with a neat transition to adjacent finishes.
  2. If mechanical or electrical work is exposed accidentally during the work, re-cover and refinish to match.
- F. Clean existing systems and equipment.
- G. Remove demolition debris and abandoned items from alterations areas and dispose of off-site; do not burn or bury.
- H. Do not begin new construction in alterations areas before demolition is complete.
- I. Comply with all other applicable requirements of this section.

### 3.07 CUTTING AND PATCHING

- A. Whenever possible, execute the work by methods that avoid cutting or patching.
- B. See Alterations article above for additional requirements.
- C. 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.
- D. Employ experienced installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.
- E. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
- F. Restore work with new products in accordance with requirements of Contract Documents.
- G. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- H. 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.

### 3.08 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.

### **3.09 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.
- F. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

### **3.10 SYSTEM STARTUP**

- A. Coordinate with requirements of Section 01 9113 - General Commissioning Requirements.
- B. Coordinate schedule for start-up of various equipment and systems.
- C. Notify Architect and Owner seven days prior to start-up of each item.
- D. 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.
- E. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
- F. Execute start-up under supervision of applicable Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.
- G. 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.

### **3.11 ADJUSTING**

- A. Adjust operating products and equipment to ensure smooth and unhindered operation.
- B. Testing, adjusting, and balancing HVAC systems: See Section 23 0593 - Testing, Adjusting, and Balancing for HVAC.

### **3.12 FINAL CLEANING**

- A. Execute final cleaning prior to final project assessment.
- B. Use cleaning materials that are nonhazardous.
- C. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
- D. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.
- E. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
- F. Clean site; sweep paved areas, rake clean landscaped surfaces.
- G. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

### **3.13 CLOSEOUT PROCEDURES**

- A. Make submittals that are required by governing or other authorities.
  - 1. Provide copies to Architect.
  - 2. Provide copies to Owner.
  - 3. Provide copies to Architect and Owner.
- B. Notify Architect when work is considered ready for Architect's Substantial Completion inspection.
- C. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Owner-occupied areas.
- D. Notify Architect when work is considered finally complete and ready for Architect's Substantial Completion final inspection.

#### **3.14 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 01 70 00**

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, 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. Contractor shall develop and follow a Waste Management Plan designed to implement these requirements.
- F. The following sources may be useful in developing the Waste Management Plan:
  - 1. State Recycling Department, at [calrecycle.ca.gov](http://calrecycle.ca.gov).
- G. 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.
- H. 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.
- 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 Management Plan: Include the following information:
  - 1. Analysis of the trash and waste projected to be generated during the entire project construction cycle, including types and quantities.
  - 2. Landfill Options: The name, address, and telephone number of the landfill(s) where trash/waste will be disposed of, the applicable landfill tipping fee(s), and the projected cost of disposing of all project trash/waste in the landfill(s).
  - 3. Landfill Alternatives: List all waste materials that will be diverted from landfills by reuse, salvage, or recycling.
  - 4. Meetings: Describe regular meetings to be held to address waste prevention, reduction, recycling, salvage, reuse, and disposal.
  - 5. Materials Handling Procedures: Describe the means by which materials to be diverted from landfills will be protected from contamination and prepared for acceptance by designated facilities; include separation procedures for recyclables, storage, and packaging.
  - 6. Transportation: Identify the destination and means of transportation of materials to be recycled; i.e. whether materials will be site-separated and self-hauled to designated centers, or whether mixed materials will be collected by a waste hauler.
- C. 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 2 PRODUCTS**

### **2.01 PRODUCT SUBSTITUTIONS**

- A. See Section 01 6000 - Product Requirements for substitution submission procedures.
- B. For each proposed product substitution, submit the following information in addition to requirements specified in Section 01 6000:
  1. Relative amount of waste produced, compared to specified product.
  2. Cost savings on waste disposal, compared to specified product, to be deducted from the Contract Price.
  3. Proposed disposal method for waste product.
  4. Markets for recycled waste product.

## **PART 3 EXECUTION**

### **3.01 WASTE MANAGEMENT PROCEDURES**

- A. See Section 01 3000 for additional requirements for project meetings, reports, submittal procedures, and project documentation.
- B. See Section 01 7000 for trash/waste prevention procedures related to demolition, cutting and patching, installation, protection, and cleaning.

### **3.02 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.
- 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**

**SECTION 01 7800  
CLOSEOUT PROCEDURES AND SUBMITTALS**

**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. Submittals and warranties.
  - 6. 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 5 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 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.
- B.
- C.

**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. 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.
- C.

**PART 2 PRODUCTS****2.01 -- NOT APPLICABLE --****2.02**

**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 70 00 - "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.
- 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 01 77 00**

**SECTION 03 3000  
CAST-IN-PLACE CONCRETE**

**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Concrete formwork.
- B. Floors and slabs on grade.
- C. Concrete foundations and anchor bolts for pre-engineered building.
- D. Concrete reinforcement.
- E. Miscellaneous concrete elements, including equipment pads and thrust blocks.
- F. Concrete curing.

**1.02 RELATED REQUIREMENTS**

- A. Section 07 9200 - Joint Sealants: Products and installation for sealants and joint fillers for saw cut joints and isolation joints in slabs.
- B. Section 32 1313 - Concrete Paving: Sidewalks, curbs and gutters.

**1.03 REFERENCE STANDARDS**

- A. ACI 117 - Specification for Tolerances for Concrete Construction and Materials; 2010 (Reapproved 2015).
- B. ACI 301 - Specifications for Concrete Construction; 2020.
- C. ACI 302.1R - Guide to Concrete Floor and Slab Construction; 2015.
- D. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; 2000 (Reapproved 2009).
- E. ACI 305R - Guide to Hot Weather Concreting; 2020.
- F. ACI 306R - Guide to Cold Weather Concreting; 2016.
- G. ACI 308R - Guide to External Curing of Concrete; 2016.
- H. ACI 318 - Building Code Requirements for Structural Concrete; 2019 (Reapproved 2022).
- I. ACI 347R - Guide to Formwork for Concrete; 2014 (Reapproved 2021).
- J. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2022.
- K. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2022.
- L. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2023.
- M. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2023.
- N. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2023.
- O. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50 mm] Cube Specimens); 2021.
- P. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete; 2020.
- Q. ASTM C150/C150M - Standard Specification for Portland Cement; 2022.
- R. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete; 2020.
- S. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method; 2023.
- T. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete; 2019.

- U. ASTM C1602/C1602M - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete; 2022.
- V. ASTM E1155 - Standard Test Method for Determining FF Floor Flatness and FL Floor Levelness Numbers; 2020.
- W. ASTM E1155M - Standard Test Method for Determining FF Floor Flatness and FL Floor Levelness Numbers (Metric); 2014.
- X. ASTM E1643 - Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs; 2018a.
- Y. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs; 2017 (Reapproved 2023).

#### **1.04 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements and installation instructions.
- C. 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.
- D. Test Reports: Submit report for each test or series of tests specified.

#### **1.05 QUALITY ASSURANCE**

- A. Perform work of this section in accordance with ACI 301 and ACI 318.
- B. Follow recommendations of ACI 306R when concreting during cold weather.

### **PART 2 PRODUCTS**

#### **2.01 FORMWORK**

- A. Formwork Design and Construction: Comply with guidelines of ACI 347R to provide formwork that will produce concrete complying with tolerances of ACI 117.
- B. Form Materials: Contractor's choice of standard products with sufficient strength to withstand hydrostatic head without distortion in excess of permitted tolerances.
  - 1. Form Coating: Release agent that will not adversely affect concrete or interfere with application of coatings.

#### **2.02 REINFORCEMENT MATERIALS**

- A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi).
  - 1. Type: Deformed billet-steel bars.
  - 2. Finish: Unfinished, unless otherwise indicated.
- B. Steel Welded Wire Reinforcement (WWR): Galvanized, plain type, ASTM A1064/A1064M.
- C. Reinforcement Accessories:
  - 1. Tie Wire: Annealed, minimum 16 gauge, 0.0508 inch.
  - 2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.
  - 3. Provide stainless steel, galvanized, plastic, or plastic coated steel components for placement within 1-1/2 inches of weathering surfaces.

#### **2.03 CONCRETE MATERIALS**

- A. 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.
  - 1. Acquire aggregates for entire project from same source.

- C. Fly Ash: ASTM C618, Class C or F.
- D. Water: ASTM C1602/C1602M; clean, potable, and not detrimental to concrete.

#### 2.04 ACCESSORY MATERIALS

- A. Underslab Vapor Barrier shall have all of the following qualities:
  - 1. Maintain permeance of less than 0.01 Perms [grains/(ft<sup>2</sup> ? hr ? inHg)] 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. Basis of Design: Stego Wrap Vapor Barrier (15-mil) by Stego Industries LLC., (877) 464-7834 [www.stegoindustries.com](http://www.stegoindustries.com) <<http://www.stegoindustries.com>>.
    - a. Approved Alternate: Vaporguard by Reef Industries, 713-507-4250. [www.reefindustries.com](http://www.reefindustries.com) <<http://www.reefindustries.com>>.
    - b. Approved Alternate: PMPC by WR Meadows, 800-342-5976. <<http://www.wrmeadows.com/pmipc/>>
  - 2. Accessory products:
    - a. Seam Tape
    - b. Perimeter/terminated edge seal
    - c. Penetration Prevention
    - d. Vapor Barrier-Safe Screed System
- C. Form Release Agent: Material which will not stain concrete or absorb moisture.
- D. Densifier / Sealer:
  - 1. Composition: Lithium Silicate w/ Silicate
  - 2. Products:
    - a. Concrete Sealers USA: [www.concretesealersusa.com](http://www.concretesealersusa.com)
    - b. PSS104: Lithium Silicate w/ Silicate Densifier WB Sealer
    - c. Substitution: See Section 01 6000- Product Requirements.
- E. Non-Shrink Cementitious Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents.
  - 1. Minimum Compressive Strength at 28 Days: 7,000 pounds per square inch.

#### 2.05 CURING MATERIALS

- A. Evaporation Reducer: Liquid thin-film-forming compound that reduces rapid moisture loss caused by high temperature, low humidity, and high winds; intended for application immediately after concrete placement.
- B. Curing Compound, Naturally Dissipating: Clear, water-based, liquid membrane-forming compound; complying with ASTM C309.
- C. Curing Agent, Water-Cure Equivalent Type: Clear, water-based, non-film-forming, liquid-water cure replacement agent.
  - 1. Comply with ASTM C309 standards for water retention.
  - 2. VOC Content: Zero.
- D. Moisture-Retaining Sheet: ASTM C171.
  - 1. White-burlap-polyethylene sheet, weighing not less than 3.8 ounces per square yard.
- E. Water: Potable, not detrimental to concrete.

#### 2.06 CONCRETE MIX DESIGN

- A. Concrete Strength: Establish required average strength for each type of concrete on the basis of field experience or trial mixtures, as specified in ACI 301.
  - 1. For trial mixtures method, employ independent testing agency acceptable to Architect for preparing and reporting proposed mix designs.

- B. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended or required by manufacturer.
- C. Normal Weight Concrete:
  - 1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: as indicated on drawings.
    - a. Foundation and Slab on Fill Concrete:
      - 1) Floor slab (28 days): 4,000 psi.
  - 2. Fly Ash Content: Maximum 15 percent of cementitious materials by weight.
  - 3. Water-Cement Ratio: Maximum 40 percent by weight.
  - 4. Total Air Content: 4 percent, determined in accordance with ASTM C173/C173M.
  - 5. Maximum Slump: 3 inches.
  - 6. Maximum Aggregate Size: 1/2 inch.

## **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. Verify that forms are clean and free of rust before applying release agent.
- C. Coordinate placement of embedded items with erection of concrete formwork and placement of form accessories.
- D. Interior Slabs on Grade: Install vapor retarder under interior slabs on grade. Comply with ASTM E1643. 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. 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.
- C. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with concrete placement.

### **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.
- F. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.
- G. Ensure reinforcement, inserts, waterstops, embedded parts, and formed construction joint devices will not be disturbed during concrete placement.

- H. Place concrete continuously without construction (cold) joints wherever possible; where construction joints are necessary, before next placement prepare joint surface by removing laitance and exposing the sand and sound surface mortar, by sandblasting or high-pressure water jetting.

### **3.05 CONCRETE FINISHING**

- A. Concrete Slabs: Finish to requirements of ACI 302.1R, and as follows:
  - 1. Surfaces to Receive Thick Floor Coverings: "Wood float" as described in ACI 302.1R; thick floor coverings include ceramic tile with full bed setting system.
  - 2. Surfaces to Receive Thin Floor Coverings: "Steel trowel" as described in ACI 302.1R; thin floor coverings include resilient flooring, seamless flooring, and thin set ceramic tile.
  - 3. Broom finish (medium) at exterior flatwork.
  - 4. 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 FIELD QUALITY CONTROL**

- A. An independent testing agency will perform field quality control tests, as specified in Section 01 4000 - Quality Requirements.
- B. Provide free access to concrete operations at project site and cooperate with appointed firm.
- C. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of concrete operations.
- D. Compressive Strength Tests: ASTM C39/C39M, for each test, mold and cure three concrete test cylinders. Obtain test samples for every 100 cubic yards or less of each class of concrete placed.
- E. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.
- F. Perform one slump test for each set of test cylinders taken, following procedures of ASTM C143/C143M.

### **3.08 DEFECTIVE CONCRETE**

- A. Test Results: The testing agency shall report test results in writing to Architect and Contractor within 24 hours of test.
- B. Defective Concrete: Concrete not complying with required lines, details, dimensions, tolerances or specified requirements.
- C. 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.
- D. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Architect for each individual area.

### **3.09 PROTECTION**

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

**END OF SECTION**

**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 08 7100 - Door Hardware: Setting exterior door thresholds in sealant.
- B. Section 09 2116 - Gypsum Board Assemblies: Sealing acoustical and sound-rated walls and ceilings.
- C. Section 09 3000 - Tiling: Sealant between tile and plumbing fixtures and at junctions with other materials and changes in plane.

**1.03 REFERENCE STANDARDS**

- A. ASTM C661 - Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer; 2015 (Reapproved 2022).
- B. ASTM C794 - Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants; 2018 (Reapproved 2022).
- C. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016 (Reapproved 2023).
- D. SCAQMD 1168 - Adhesive and Sealant Applications; 1989, with Amendment (2022).

**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.
  - 4. Installation instructions, including precautions, limitations, and recommended backing materials and tools.
- C. Product Data for Accessory Products: Submit manufacturer's technical data sheet for each product to be used, including physical characteristics, installation instructions, and recommended tools.
- D. Manufacturer's Qualification Statement.

**1.05 QUALITY ASSURANCE****1.06 WARRANTY**

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Warranty: Include coverage for installed sealants and accessories that fail to achieve watertight seal, exhibit loss of adhesion or cohesion, or do not cure.

**PART 2 PRODUCTS****2.01 MANUFACTURERS**

- A. Non-Sag Sealants: Permits application in joints on vertical surfaces without sagging or slumping.

**END OF SECTION**

**SECTION 09 9000  
PAINTING AND COATING**

**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Surface preparation.
- B. Field application of paints.
- C. Scope: Finish all interior and exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:
  - 1. Both sides and edges of plywood backboards for electrical and telecom equipment before installing equipment.
  - 2. Exposed surfaces of steel lintels and ledge angles.
  - 3. Mechanical and Electrical:
    - a. In finished areas, paint all insulated and exposed pipes, unless otherwise indicated.
    - b. Paint interior surfaces of air ducts and convector and baseboard heating cabinets that are visible through grilles and louvers with one coat of flat black paint to visible surfaces.
    - c. Paint dampers exposed behind louvers, grilles, and convector and baseboard cabinets to match face panels.
- 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. Non-metallic roofing and flashing.
  - 6. Stainless steel, anodized aluminum, bronze, terne, and lead items.
  - 7. Marble, granite, slate, and other natural stones.
  - 8. Floors, unless specifically so indicated.
  - 9. Ceramic and other tiles.
  - 10. Brick, architectural concrete, cast stone, integrally colored plaster and stucco.
  - 11. Glass.
  - 12. Concrete masonry in utility, mechanical, and electrical spaces.
  - 13. Acoustical materials, unless specifically so indicated.
  - 14. Concealed pipes, ducts, and conduits.

**1.02 RELATED REQUIREMENTS**

- A. Section 13 3419 - Metal Building Systems
- B. Section 22 0553 - Identification for Plumbing Piping and Equipment: Painted identification.
- C. Section 26 0553 - Identification for Electrical Systems: Painted identification.

**1.03 REFERENCE STANDARDS**

- A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.
- B. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2023.
- C. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials; 2020.

**1.04 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. Manufacturer's installation instructions.
- C. Samples: Submit 2 paper "draw down" samples, 8-1/2 by 11 inches in size, illustrating range of colors available for each finishing product specified.
  - 1. Where sheen is specified, submit samples in only that sheen.
  - 2. Where sheen is not specified, discuss sheen options with Architect before preparing samples, to eliminate sheens definitely not required.

### **1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum 5 years experience.

### **1.06 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.

### **1.07 FIELD CONDITIONS**

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Do not apply exterior coatings during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.
- D. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS**

- A. 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.
- B. Paints:
  - 1. Benjamin Moore & Co: [www.benjaminmoore.com/#sle](http://www.benjaminmoore.com/#sle).
  - 2. Sherwin-Williams Company: [www.sherwin-williams.com/#sle](http://www.sherwin-williams.com/#sle).
  - 3. Vista Paint.
- C. Primer Sealers: Same manufacturer as top coats.
- D. 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.
  - 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.
    - b. Architectural coatings VOC limits of the State in which the Project is located.
  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.
- D. Colors: To be selected from manufacturer's full range of available colors.
1. In finished areas, finish pipes, ducts, conduit, and equipment the same color as the wall/ceiling they are mounted on/under.
  2. In utility areas, finish equipment, piping, conduit, and exposed duct work in colors according to the color coding scheme indicated.

### 2.03 PAINT SYSTEMS - INTERIOR

- A. Paint I-OP - All Interior Surfaces Indicated to be Painted, Unless Otherwise Indicated: Including gypsum board.
1. Two top coats and one coat primer.
  2. Eggshell: MPI gloss level 3; use this sheen at all locations.
  3. Top Coat Product(s):
    - a. Sherwin-Williams Harmony Interior Acrylic Latex. (MPI #44, 53, 54, 143, 144)
    - b. Dunn-Edwards.
  4. Primer(s): As recommended by manufacturer of top coats.
- B. Paint I-OP-DF - Dry Fall: Metals; exposed structure and overhead-mounted services in utilitarian spaces, including shop primed steel deck.
1. Shop primer by others.
  2. One top coat, white.

### 2.04 ACCESSORY MATERIALS

- A. Accessory Materials: Provide all primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials required to achieve the finishes specified whether specifically indicated or not; commercial quality.
- B. Patching Material: Latex filler.
- C. Fastener Head Cover Material: Latex filler.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Do not begin application of coatings until substrates have been properly prepared.
- B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
- D. Test shop-applied primer for compatibility with subsequent cover materials.
- E. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
  1. Gypsum Wallboard: 12 percent.

2. Exterior Wood: 15 percent, measured in accordance with ASTM D4442.

### 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.
- F. Gypsum Board Surfaces to be Painted: Fill minor defects with filler compound. Spot prime defects after repair. Brush off walls and ceilings prior to texturing and painting.
- G. Exterior Wood Surfaces to Receive Opaque Finish: Remove dust, grit, and foreign matter. Seal knots, pitch streaks, and sappy sections. Fill nail holes with tinted exterior caulking compound after prime coat has been applied. Back prime concealed surfaces before installation.
- H. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

### 3.03 APPLICATION

- A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- B. Exterior Wood to Receive Opaque Finish: If final painting must be delayed more than 2 weeks after installation of woodwork, apply primer within 2 weeks and final coating within 4 weeks.
- C. Apply products in accordance with manufacturer's instructions.
- D. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.
- E. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- F. Apply each coat to uniform appearance.
- G. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply as many coats as necessary for complete hide.
- H. Sand wood and metal surfaces lightly between coats to achieve required finish.
- I. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- J. 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. 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 Carbozinc 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 Carbozinc 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. 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.
- B. 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.
- C. 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.

**END OF SECTION**

**SECTION 09 9300  
STAINING AND TRANSPARENT FINISHING**

**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Surface preparation.
- B. Field application of stains and transparent finishes.

**1.02 REFERENCE STANDARDS**

- A. CARB (SCM) - Suggested Control Measure for Architectural Coatings; California Air Resources Board; 2020.
- B. SCAQMD 1113 - Architectural Coatings; 1977, with Amendment (2016).

**1.03 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide complete list of products to be used, with the following information for each:
  - 1. Manufacturer's name, product name and/or catalog number, and general product category.
- C. Samples: Submit two samples, illustrating selected colors and sheens for each system with specified coats cascaded. Submit on actual wood substrate to be finished, 4 x 4 inch in size.
- D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. See Section 01 6000 - PRODUCT REQUIREMENTS, for additional provisions.
  - 2. Extra Stain and Transparent Finish Materials: 1 gallon of each color and type; from the same product run, store where directed.
  - 3. Label each container with color and type in addition to the manufacturer's label.

**1.04 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 stain or transparent finish, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Stain and Transparent Finish 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.

**PART 2 PRODUCTS****2.01 MANUFACTURERS**

- A. Provide finishes from the same manufacturer.
- B. Wood Stain and Sealer:
  - 1. Timber Pro Coatings (USA Sales), 2232 E. Burnside Ave., Portland, OR 97214. Ph: 888-888-6095. Website-www.timberprocoatings.com.
  - 2. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

**2.02 EXTERIOR STAIN AND TRANSPARENT FINISH SYSTEMS**

- A. Finish on Wood:
  - 1. 2 coat(s) stain.
  - 2. 1 coat(s) sealer.
  - 3. Natural Oil Waterborne Wood Stain: Penetrating wood stain and protectant for interior and exterior wood.
    - a. Timber Pro Coatings- Log and Siding Smooth Formula.
    - b. Finish: Transparent Series Stain
      - 1) Colors: To be selected by Architect from manufacture's full range of available colors.

**PART 3 EXECUTION****3.01 EXAMINATION**

- A. Do not begin application of stains and finishes until substrates have been properly prepared.
- B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

**3.02 PREPARATION**

- A. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- B. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.
- C. Wood Surfaces to Receive Transparent Finish: Wipe off dust and grit prior to sealing, seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after sealer has dried; sand lightly between coats. Prime concealed surfaces with gloss varnish reduced 25 percent with thinner.

**3.03 APPLICATION**

- A. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- B. Apply each coat to uniform appearance in thicknesses specified by manufacturer.
- C. Sand wood surfaces lightly between coats to achieve required finish.
- D. Apply without runs, drips, or sags, without brush marks, and with a consistent sheen.

**3.04 FIELD QUALITY CONTROL**

- A. See Section 01 4000 - Quality Requirements, for general requirements for field inspection.

**3.05 CLEANING**

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

**END OF SECTION**

**SECTION 13 3416  
NON-ELEVATED BLEACHERS**

**SECTION INCLUDES****1.01 DESIGN AND FABRICATION OF NON-ELEVATED ANGLE FRAME BLEACHERS****1.02 QUALITY ASSURANCE**

- A. Manufacturer: Belson Outdoors
- B. Manufacturer Qualifications: Manufacturer must have a minimum of ten years experience in the design and manufacture of bleachers.
- C. Welders must conform to AWS standards.
  - 1. Source Quality Control: Mill Test Certification.

**1.03 WARRANTY****1.04 ENGINEERING**

- A. Provide Engineering certifications and calculations by a California Registered Professional Engineer.

**PART 2 – PRODUCTS****2.01 ACCEPTABLE MANUFACTURER**

- A. Belson Outdoors
  - 1. Basis of Design: Non- Elevated Aluminum Bleachers; model BP-0515V, 5-row x 15'-0" w/ vertical picket guardrail.

**2.02 DESIGN**

- A. Applicable Codes:
  - 1. INTERNATIONAL BUILDING CODE (IBC), 2021 EDITION
- B. Design Loads:
  - 1. Live Loads:
    - a. Uniform loading - Structure = 100 psf
    - b. Uniform loading - Seat and Foot plank = 120 plf
  - 2. Sway Loads:
    - a. Perpendicular to seats = 10 plf
    - b. Parallel to seats = 24 plf
  - 3. Guardrail Loads:
    - a. Uniform vertical load = 100 plf Uniform
    - b. horizontal load = 50 plf Concentrated horizontal load = 200 pounds
  - 4. \*Wind Loads:
    - a. Basic design wind speed = 150 mph (exposure "B")
    - b. \*Note: Bleacher must be anchored to meet wind loads above

**2.03 ANGLE FRAME BLEACHERS**

- A. Framework:
  - 1. Prefabricated aluminum angle spaced at 6' - 0" intervals joined by means of aluminum angle cross bracing.
- B. Shop Connections:
  - 1. Welded to meet AWS standards and local code requirements.
- C. Joint Sleeve Assembly:
  - 1. Internal splices, where required shall be two per joint, and shall penetrate the joint a minimum of 8" in each direction and be riveted at one end only to allow for contraction and expansion.
- D. Rise and Depth Dimensions:
  - 1. 6" vertical rise and 24" tread depth, Seat height is 17" above its respective tread.
- E. Seats:

1. Nominal 2" x 10" anodized aluminum with anodized end caps.
- F. Treads:
  1. Nominal two (2) 2" x 10" mill finish aluminum with anodized end caps on rows 2 & up.
- G. Guardrail: Rails shall be anodized aluminum tube with end plugs and elbows where required.
  1. All Rails shall be secured to angle supports with galvanized fasteners. Top rails at sides, rear and front shall be 42" above the leading edge of seat or walking surfaces. Rear rail support members shall be aluminum channel, side and front rail support s shall be aluminum angle.
  2. Vertical Picket System: Rails shall be panels of anodized aluminum vertical pickets with a 1-5/8" aluminum tube steel frame.

#### **2.04 MATERIALS / FINISHES**

- A. Framework:
- B. Aluminum: Structural fabrication with aluminum alloy 6061-T6 mill finish. Each frame shall be unit-welded, using metal inert gas method, under guidelines by the American Welding Society. After fabrication all steel is hot dipped galvanized to ASTM A-123 specifications.
- C. Extruded Aluminum:
  1. Seat planks: Aluminum alloy 6063-T6, clear anodized 204R1, AA-M10C22A31, Class II With a wall thickness nominally .078" for impact and deformation resistance.
  2. Tread and Riser Planks: Aluminum alloy 6063-T6, mill finish. With a wall thickness nominally .078" for impact and deformation resistance.
  3. Guardrail Pipe: 1-5/8 OD schedule 40 aluminum alloy 6105-T5, clear anodized 204R1, AA-M10C22A31, Class II.
- D. Accessories:

### **PART 3 – EXECUTION**

#### **3.01 INSTALLATION**

- A. Install bleacher unit in accordance with manufacturer written instructions and shop drawings.
- B. Note: The vendor is responsible for verification of local code requirements.

**SECTION 13 3419  
METAL BUILDING SYSTEMS**

**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Manufacturer-engineered, shop-fabricated structural steel building frame.
  - 1. Barn
  - 2. Corral Shelter (Mare Motel)
- B. Metal Roof panels and wall cladding.
- C. Exterior doors and windows.

**1.02 RELATED REQUIREMENTS**

- A. Section 03 3000 - Cast In Place Concrete
- B. Section 09 9300 - Staining and Transparent Finishing

**1.03 REFERENCE STANDARDS**

- A. AISC 360 - Specification for Structural Steel Buildings; 2022.
- B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
- C. ASTM A529/A529M - Standard Specification for High-Strength Carbon-Manganese Steel of Structural Quality; 2019.
- D. ASTM A572/A572M - Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel; 2021, with Editorial Revision.
- E. ASTM A992/A992M - Standard Specification for Structural Steel Shapes; 2022.
- F. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2020.

**1.04 DESIGN REQUIREMENTS**

- A. Design members to withstand 20 psf live load, 5 psf nominal snow load, and 110 psf positive and negative wind loads. Seismic design category "D".
- B. Basic Design Loads: To include Roof Live Load of 20 PSF, Collateral Load of 3, Minimum Roof Snow Load of 5, Ground Snow Load of 5, Wind Load of 3 second speed 110 mph, Exposure C<sub>1</sub> and Seismic Load of S<sub>s</sub>= 1.400, S<sub>1</sub>= .536, Soil Class=D in addition to dead loads. Consider all other design loads, whether they are of static or dynamic nature, as auxiliary loads, or as per drawings show/indicate.

**1.05 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, anchorages and method of anchorage, installation; framing anchor bolt settings, sizes, and locations from datum, foundation loads; indicate welded connections with AWS A2.4 welding symbols; indicate net weld lengths; provide professional seal and signature.

**1.06 WARRANTY**

- A. See Section 01 7700 - Closeout Submittals, for additional warranty requirements
- B. All Components: Manufacturer's standard one (1) year workmanship warranty.

**PART 2 PRODUCTS****2.01 MANUFACTURERS**

- A. Metal Buildings Systems:
  - 1. Castlebrook Barns
    - a. 14600 Whittram Ave., Fontana, CA 92335 ; [www.castlebrookbarns.com](http://www.castlebrookbarns.com);  
Ph-800.52BARNs.

- b. Contact: Jason Price-ph 909-822-0500
- 2. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

## 2.02 ASSEMBLIES

- A. Truss frame.
- B. Bay Spacing: 12 ft.
- C. Secondary Framing: Purlins, and other items detailed.
- D. Wall System: Wood decking held in place with steel channels.
- E. Roof System: Preformed metal panels oriented parallel to slope, with sub-girt framing/anchorage assembly, and accessory components.
- F. Roof Slope: 4 inches in 12 inches.

## 2.03 PERFORMANCE REQUIREMENTS

- A. Provide drainage to exterior for water entering or condensation occurring within wall or roof system.
- B. 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.

## 2.04 MATERIALS

- A. Barn Walls/Framework:
  - 1. Walls shall consist of 2" x 6" infill consisting of Select Deck, SPF, kiln-dried, tongue and groove unfinished boards.
  - 2. The above lumber shall be held in place with 3/16" (ASTM Specifications A36) structural steel painted columns consisting of 1-7/8" I.D. wide painted channel on each end and shall rest on a 1-1/2" x 1-1/2" x .065 painted bottom tube with a 3/16" H Bracket centered in wall.
  - 3. The bottom tube receiver on each of the 3/16" structural steel painted columns are anchored to the concrete stemwall with 2" x 2" x 3/16" angle brackets with a 1/2" Wedge Anchor (3-3/4" to 7" in depth pending engineering) that are bolted to the bottom tube receivers with a 3/8" zinc bolt.
  - 4. Lateral support walls must include a 2" x 3/16" X-Brace that must be bolted as described above with a 3/8" Grade 5 zinc bolt. For these locations there shall be a total of (4) 1/2" x 5-1/2" wedge anchors used at each bottom bracket of X Brace locate at the tube receiver.
  - 5. All Framework located at eave height or below shall be painted, and framework located above eave height to be galvanized. Standard painted framework colors to be selected from two (2) standard color selections offered by manufacturer.
- B. Roofing:
  - 1. Pre-Finished Roof Panels; coill base Mega Rib (7.2) profile, 26 ga., Zinalume coil base material in a Mega Rib (7.2) profile.
    - a. The roof panels are to be secured by #12x3/4" Hex Washer Head Zinc Tek screw w/sealing washer in each roof panel valley and at each z purlin.
    - b. Panel-to-panel connections shall be secured by #14 x 7/8" #1 Point Tek Zinc Screw with sealing washer 9" on center.
    - c. Roof colors to be selected from eight (8) standard color selections offered by manufacturer.
    - d. Skylight panels to match Mega Rib (7.2 panel) opaque fiberglass
  - 2. Rooftop Cupola
    - a. Metal Cupola, 36 inch square base (with internal steel gussets), 52 inch high
    - b. Constructed of 29 gauge prepainted steel.
    - c. Louver vents
    - d. Steel Weathervane:
- C. Fascia:
  - 1. Fascia shall be 5" painted Zinalume. Located on gable ends of barn only.
- D. Purlins:

1. "Z" and "Hat" purlines shall be roll-formed using 12, 14 and/or 16 ga., ASTM A653 G-90 Galvanized steel.

## 2.05 BARN DOORS

- A. Pre-engineered barn buildings shall provide structural support for barn doors
- B. Door Construction:
  1. Rear Stall sliding doors shall consist of 2" x 6" Select deck, SPF, kiln-dried, tongue and groove unfinished boards encased in 2" x 3/16" A36 framework with the top approx. 4' portion of the door hinged to open separately from main door.
  2. Stall Front sliding doors consist of approximately 4' of 2" x 6" Select deck, SPF, kiln-dried, tongue and groove unfinished boards followed by approximately 4' and 3/4" x .065 square tube pickets encased in 2" x 3/16" A36 framework.
  3. Tack Room doors shall be a 4' x 7' hinged man door consisting of 2" x 6", Select deck, SPF, kiln-dried, tongue and groove unfinished boards encased in 2" x 3/16" A36 framework.
  4. Trolley track of sealed Delron.
- C. Barn Door Hardware:
  1. Overhead Track: 16-gauge painted steel track section.
  2. Overhead Track Support Brackets: 3/16" painted structural steel spaced at approximately 22" apart.
  3. Bottom Door Guide: 3/16" painted structural steel.
  4. Provide front and back trolley stops.
  5. Provide horse stall door latch for all sliding doors.
  6. Provide temporary door handle for man door.

## 2.06 COMPONENTS

- A. Doors and Frames: Manufacturer's standard.
  1. Solid Dutch Door
  2. Grilled Dutch Door
  3. Solid Swing Door
    - a. Latchset: Storage function, Lever
    - b. Manuf: Schlage Series ND, ND80PD RHO, finish 626. Provide floor stop.
      - 1) Or Approved equal.
- B. Windows: Manufacturer's standard.
  1. Arched window: Steel frame with plexiglass glazing.
  2. Size: 34" W x 42" H.
- C. Grilled Stall Front: 8 foot high with open feed window
- D. Grilled Stall dividers: 4 foot x 12 foot.
- E. Solid Walls: T&G siding 8 foot high.
- F. Dropped Ceiling: T&G 12 foot x 12 foot.
  1. As indicated in drawings.

## 2.07 ACCESSORIES

- A. Horseshoe Blanket Bar: Castlebrook Barn
- B. Horse Stall Mat: Min. size 4 foot x 6 foot x 3/4 inch thk.
  1. Coverage-wall to wall.
- C. Water Trough:
  1. Manuf. Countryline, 24 inch W x 48 inch L x 24 inch H galvanized steel. Capacity 51-100 gal., with threaded drain plug.
  2. Available at Tractor Supply.
  3. Or Approved equal.
- D. Hitching Post:

1. Manuf.: Castlebrook Barns; 2-7/8 inch dia. x 8 foot wide x 7 foot high. Galv. steel, with Rope loops at each end. Pipe ends capped or welded closed.

- E. Corral Panels: 1-7/8 inch dia, 16 ga. galv. steel tubing.

## **2.08 FABRICATION - FRAMING**

- A. Fabricate members in accordance with AISC 360 for plate, bar, tube, or rolled structural shapes.

## **2.09 FINISHES**

- A. Framework: All painted framework to be shot blasted prior to painting to remove grease, oil, mill scale, etc..
- B. Exterior and Interior Surfaces of wood T&G siding Stained and sealed:
  1. Stain and sealer: Specified in Section 09 9300 Staining and Transparent Finishing

## **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. Erect pre-engineered barn system according to manufacturer's written instructions and erection drawings. A color post and tube layout showing locations of posts, tubes, roof substructure, lumber, etc. along with assembly instructions shall be supplied by manufacturer
- C. 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.
- D. Temporary supports, such as temporary guides, braces, falsework, cribbing or other elements required for the erection operation will be determined, furnished and installed by the erector. Manufacturer's structures will not support any temporary loads or otherwise until 100% complete per manufacturer's standards.
- E. Set column base plates with non-shrink grout to achieve full plate bearing.
- F. Do not field cut, drill, or alter members without written approval from manufacturer.
- G. 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.
- C. Fasten cladding system to structural supports, aligned level and plumb.
  1. Where cladding is indicated.
  2. Locate end laps over supports. End laps minimum 2 inches. Place side laps over bearing.
- D. Provide expansion joints where indicated.
- E. Use concealed fasteners.
- F. Install sealant and gaskets, providing weather tight installation.

### **3.04 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**

**SECTION 220010  
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. Water piping systems inside and outside the building, including connections to hose bibbs.
  4. Plumbing hose bibbs.
  5. Shop drawings.
  6. Written operating and maintenance instructions.
  7. Record drawings.
  8. Guarantee

**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.

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
7. AWS - 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.

## **1.0 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 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.
- 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 1/4" 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. Shop fabrication drawings and installation drawings of piping layouts. Submit for approval prior to fabrication. Drawings shall indicate dimensions from bottom of piping to finish floor level.
  - 5. Hose bibs.
  - 6. 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. "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 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.

#### **1.14 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.

#### **1.15 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.

#### **1.16 LOCATIONS AND ACCESSIBILITY**

- A. Drawings show piping diagrammatically. Conform to Drawings as closely as possible in layout work. Vary run of piping and make offsets during progress of work as required to meet structural and other interferences as reviewed by Architect and / or Engineer. Install piping to best suit field conditions after coordinating with other trades. Run exposed piping 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. If changes in the indicated locations or arrangements are required, they shall be made without additional charges.
- C. 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.

### **1.17 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 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.

### **1.1 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.
- B. 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
  4. Incorrect or inadequate operation or other failure
- C. 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
- D. Furnish the parts and labor to replace any items found to be defective in the refrigeration equipment with the guarantee period
- E. 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.

#### **1.19 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.

#### **1.20 CLOSING-IN OF UN-INSPECTED WORK**

- A. Contractor shall not allow or cause any of the work, specifically 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.

#### **1.21 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.

#### **1.22 EXCAVATION TRENCHING AND BACK FILLING**

- A. Excavating, trenching and back filling for utilities within the building area shall be done in conformity with Division 31 - Site work. Piping shall be installed promptly after excavation in order to keep the trenches open as short a time as possible.
- B. Excavating, trenching and back filling 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.

#### **1.23 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.

#### **1.24 MAINTAINING EXISTING SERVICES**

- A. 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.
- B. 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.
- C. 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.
- D. 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.

#### **1.25 ELECTRICAL WOR**

- 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 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 22, unless otherwise indicated on the drawings.
- G. Conduit for control wiring shall be provided by Division 26.

**SECTION 221005  
PLUMBING PIPING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Domestic water piping, buried beyond 5 feet of building.

**1.02 REFERENCE STANDARDS**

- A. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings 2021.
- B. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings 2021.
- C. ASME B31.9 - Building Services Piping 2020.
- D. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Qualification Standard for Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators 2023.
- E. ASTM B42 - Standard Specification for Seamless Copper Pipe, Standard Sizes 2020.
- F. ASTM B88 - Standard Specification for Seamless Copper Water Tube 2022.
- G. ASTM D2564 - Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems 2020.
- H. ASTM D2661 - Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe and Fittings 2021.
- I. ASTM D2665 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings 2020.
- J. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2023c.
- K. ASTM F628 - Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe with a Cellular Core 2023.
- L. AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding 2019.
- M. AWWA C110/A21.10 - Ductile-Iron and Gray-Iron Fittings 2021.
- N. AWWA C111/A21.11 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings 2023.
- O. AWWA C151/A21.51 - Ductile-Iron Pipe, Centrifugally Cast 2017, with Errata (2018).
- P. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. through 60 In. (100 mm through 1500 mm) 2022.

- Q. CISPI 301 - Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications 2021.
- R. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends 2010, with Errata .
- S. NSF 61 - Drinking Water System Components - Health Effects 2022, with Errata.
- T. NSF 372 - Drinking Water System Components - Lead Content 2022.
- U. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials Current Edition, Including All Revisions.
- V. ASME - Boiler and Pressure Vessel Code
- W. AGA - American Gas Association Code

### 1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.
- C. Shop Drawings: For non-penetrating rooftop supports, submit detailed layout developed for this project, with design calculations for loadings and spacings.
- D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. Valve Repacking Kits: One for each type and size of valve.

### 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. Qualify procedures and operators in accordance with ASME Boiler and Pressure Vessel Code.
- E. Piping materials shall bear label, stamp, or other markings fo specified testing agency.

### 1.05 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.
- D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.
- E. Handling Flammable Liquids: Remove and dispose of liquids from existing natural-gas piping in accordance with requirements of authorities having jurisdiction.
- F. Protect and store PE pipes and valves from direct sunlight.
- G. Handle, store, and protect equipment and materials to prevent damage before and during installation in accordance with the manufacturer's recommendations. Replace all damaged or defective items.

### 1.06 FIELD CONDITIONS

- A. Do not install underground piping when bedding is wet or frozen.
- B. Interruption of Existing Utility Service: Do not interrupt service to facilities occupied by owner or others unless permitted under the following conditions and then only after arranging to provide temporary service in accordance with requirements indicated:
  - 1. Notify Construction Manager no fewer than two days in advance of proposed interruption of sanitary waste service.
  - 2. Do not proceed with interruption of sanitary waste service without Construction Manager's written permission.
- C. Become familiar with details of the scope of work, verify dimensions in the field, and advise the Architect / Engineer of any discrepancy prior to performing any work.

## 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 14, NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.
- B. Plenum-Installed Acid Waste Piping: Flame-spread index equal or below 25 and smoke-spread index equal or below 50 according to ASTM E84 or UL 723 tests.

### 2.02 DOMESTIC WATER PIPING BURIED BEYOND 5 FEET OF BUILDING

- A. Ductile Iron Pipe: AWWA C151/A21.51.
- B. Ductile Iron Pipe: AWWA C151/A21.51.
  - 1. Fittings: AWWA C110/A21.10, ductile or gray iron, standard thickness.
  - 2. Joints: AWWA C111/A21.11, styrene-butadiene rubber (SBR) or vulcanized SBR gasket with 3/4-inch diameter rods.

- C. Copper Pipe: ASTM B42, hard drawn.
- D. Copper Pipe: ASTM B42, hard drawn.
  - 1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22 wrought copper and bronze.
- E. PVC Schedule 80 Pipe: ASTM D 1785.
  - 1. PVC, Schedule 80 Socket Fittings: ASTM D 2467.
  - 2. PVC, Schedule 80 Threaded Fittings: ASTM D 2464.

### 2.03 BALL VALVES

- A. Manufacturers:
  - 1. Tyco Flow Control: [www.tycoflowcontrol.com](http://www.tycoflowcontrol.com).
  - 2. Apollo Valves: [www.apollovalves.com](http://www.apollovalves.com).
  - 3. Nibco, Inc: [www.nibco.com/#sle](http://www.nibco.com/#sle).
  - 4. Uponor, Inc: [www.uponorengineering.com/#sle](http://www.uponorengineering.com/#sle).
  - 5. Viega LLC: [www.viega.us/#sle](http://www.viega.us/#sle).
  - 6. Stockham: [www.stockham.com](http://www.stockham.com)
- B. Construction, 4 inch and Smaller: MSS SP-110, Class 150, 400 psi CWP, bronze or ductile iron body, 304 stainless steel or chrome plated brass ball, regular port, teflon seats and stuffing box ring, blow-out proof stem, lever handle with balancing stops, threaded or grooved ends with union.
- C. Construction, 4 Inches and Smaller: MSS SP-110, Class 150, 400 psi 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 accordance with manufacturer's instructions.
- B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- C. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
- D. Install piping to maintain headroom, conserve space, and not interfere with use of space.
- E. Group piping whenever practical at common elevations.
- F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- G. Shut-off valves shall be provided on all main branches, runs to risers and where shown on drawings.
- H. Provide access where valves and fittings are not exposed.
- I. Prepare exposed, unfinished pipe, fittings, supports, and accessories ready for finish painting. Color to be specified by architect.
- J. Exposed, unfinished pipe, fittings, supports, and accessories shall be painted.
- K. Exterior piping, fittings, supports and accessories shall have approved UV protection
- L. Install valves with stems upright or horizontal, not inverted. See Section 220523.
- M. Provide stem extension on all valves for piping requiring insulation to ensure valve can be cycled without damaging pipe insulation.
- N. Install water piping to ASME B31.9.

### **3.04 APPLICATION**

- A. Use grooved mechanical couplings and fasteners only in accessible locations.
- B. Install unions downstream of valves and at equipment or apparatus connections.
- C. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.
- D. Install ball valves for throttling, bypass, or manual flow control services.
- E. Provide spring-loaded check valves on discharge of water pumps.
- F. Provide flow controls in water recirculating systems where indicated.

### **3.05 FIELD TESTS AND INSPECTIONS**

- A. Verify and inspect systems according to requirements by the Authority Having Jurisdiction. In the absence of specific test and inspection procedures proceed as indicated below.

**B. Domestic Water Systems:**

1. Perform hydrostatic testing for leakage prior to system disinfection.
2. Test Preparation: Close each fixture valve or disconnect and cap each connected fixture.
3. General:
  - a. Fill the system with water and raise static head to 10 psi above service pressure. Minimum static head of 50 to 150 psi. As an exception, certain codes allow a maximum static pressure of 80 psi.

C. Test Results: Document and certify successful results, otherwise repair, document, and retest.

**3.06 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 2019 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.

NOT FOR BIDD

**SECTION 26 00 10**  
**BASIC ELECTRICAL REQUIREMENTS**

**PART 1 GENERAL****1.01 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.

**1.02 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 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:
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. NOT USED
- 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.
  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. Panelboards.
    - b. Conduits
    - c. Conductors, include all selected insulation types.
    - d. Fuses
    - e. Disconnect switches and Starters.
    - f. Pullboxes, manholes and handholes.

- 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 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.
  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.
- N. NOT USED
- 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.
  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.
  - 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.

### 1.03 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 2014 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.
- 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**

**SECTION 26 05 19**  
**LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES**

**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Single conductor building wire.
- B. Wiring connectors.
- C. Electrical tape.
- D. Heat shrink tubing.
- E. Wire pulling lubricant.
- F. Cable ties.

**1.02 RELATED REQUIREMENTS**

- A. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

**1.03 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 the contract documents. Obtain direction before proceeding with work.

**1.04 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.

**1.05 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.

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Receive, inspect, handle, and store conductors and cables in accordance with manufacturer's instructions.

**PART 2 PRODUCTS****2.01 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.

## 2.02 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:
  - 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: 10 AWG, for voltage drop.
      - 2) 20 A, 120 V circuits longer than 150 feet: 8 AWG, for voltage drop.
      - 3) 20 A, 277 V circuits longer than 150 feet: 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. 208Y/120 V, 3 Phase, 4 Wire System:
      - 1) Phase A: Black.
      - 2) Phase B: Red.
      - 3) Phase C: Blue.
      - 4) Neutral/Grounded: White.
    - b. Equipment Ground, All Systems: Green.

## 2.03 SINGLE CONDUCTOR BUILDING WIRE

- A. Manufacturers:
  - 1. Copper Building Wire:
    - a. Cerro Wire LLC: [www.cerrowire.com/#sle](http://www.cerrowire.com/#sle).

- b. Encore Wire Corporation: [www.encorewire.com/#sle](http://www.encorewire.com/#sle).
  - c. Southwire Company: [www.southwire.com/#sle](http://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.

#### 2.04 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 for standard applications and 302 degrees F 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.

#### 2.05 WIRING ACCESSORIES

- A. Electrical Tape:
- 1. Vinyl Color Coding Electrical Tape: Integrally colored to match color code indicated; listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; suitable for continuous temperature environment up to 221 degrees F.
  - 2. Vinyl Insulating Electrical Tape: Complying with ASTM D3005 and listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; conf

- ormable for application down to 0 degrees F and suitable for continuous temperature environment up to 221 degrees F.
3. Rubber Splicing Electrical Tape: Ethylene Propylene Rubber (EPR) tape, complying with ASTM D4388; minimum thickness of 30 mil; suitable for continuous temperature environment up to 194 degrees F and short-term 266 degrees F overload service.
  4. Electrical Filler Tape: Rubber-based insulating moldable putty, minimum thickness of 125 mil; suitable for continuous temperature environment up to 176 degrees F.
  5. Moisture Sealing Electrical Tape: Insulating mastic compound laminated to flexible, all-weather vinyl backing; minimum thickness of 90 mil.
- 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**

### **3.01 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.

### **3.02 PREPARATION**

- A. Clean raceways thoroughly to remove foreign materials before installing conductors and cables.

### **3.03 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 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.
- 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 of slack at each outlet.
- H. Where conductors are installed in enclosures for future termination by others, provide a minimum of 5 feet 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 contaminants. 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.
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.

**3.04 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**

**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Grounding and bonding requirements.
- B. Conductors for grounding and bonding.
- C. Connectors for grounding and bonding.
- D. Ground rod electrodes.

**1.02 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. NEMA GR 1 - Grounding Rod Electrodes and Grounding Rod Electrode Couplings; 2007.
- 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. UL 467 - Grounding and Bonding Equipment; Current Edition, Including All Revisions.

**1.03 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 the contract documents. Obtain direction before proceeding with work.
- B. Sequencing:
  - 1. Do not install ground rod electrodes until final backfill and compaction is complete.

**1.04 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.
- C. Project Record Documents: Record actual locations of grounding electrode system components and connections.

**1.05 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.

## 1.06 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

## PART 2 PRODUCTS

### 2.01 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.
    - 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 at an accessible location not more than 5 feet 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 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. Grounding for Separate Building or Structure Supplied by Feeder(s) or Branch Circuits:
  - 1. Provide grounding electrode system for each separate building or structure.
  - 2. Provide equipment grounding conductor routed with supply conductors.
  - 3. For each disconnecting means, provide grounding electrode conductor to connect equipment ground bus to grounding electrode system.
  - 4. Do not make any connections and remove any factory-installed jumpers between neutral (grounded) conductors and ground.
- G. NOT USED

- H. 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. Provide insulated equipment grounding conductor in each feeder and branch circuit raceway. Do not use raceways as sole equipment grounding conductor.
  3. Where circuit conductor sizes are increased for voltage drop, increase size of equipment grounding conductor proportionally in accordance with NFPA 70.
  4. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
  5. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on neutral (grounded) or isolated/insulated ground bus.
  6. Provide bonding jumper across expansion or expansion/deflection fittings provided to accommodate conduit movement.

## 2.02 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.
- D. Ground Rod Electrodes:
1. Comply with NEMA GR 1.
  2. Material: Copper-bonded (copper-clad) steel.
  3. Size: 3/4 inch diameter by 10 feet length, unless otherwise indicated.

## PART 3 EXECUTION

### 3.01 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.

### 3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).

- C. Ground Rod Electrodes: Unless otherwise indicated, install ground rod electrodes vertically. Where encountered rock prohibits vertical installation, install at 45 degree angle or bury horizontally in trench at least 30 inches (750 mm) deep in accordance with NFPA 70 or provide ground plates.
- D. 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.
- E. Identify grounding and bonding system components in accordance with Section 26 05 53.

### 3.03 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.
- D. Investigate and correct deficiencies where measured ground resistances do not comply with specified requirements.

**END OF SECTION**

**SECTION 26 05 29**  
**HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS**

**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Support and attachment requirements and components for equipment, conduit, cable, boxes, and other electrical work.

**1.02 NOT USED****1.03 REFERENCE STANDARDS**

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.
- 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; 2015.
- 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.

**1.04 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.
  - 5. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

**1.05 SUBMITTALS**

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets for channel (strut) framing systems, non-penetrating rooftop supports, and post-installed concrete and masonry anchors.
- B. Shop Drawings: Include details for fabricated hangers and supports where materials or methods other than those indicated are proposed for substitution.

**1.06 QUALITY ASSURANCE**

- A. Comply with NFPA 70.
- B. Comply with applicable building code.

**1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

## 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 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 supported with 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.
  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: 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.
  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**

### **3.01 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.

### **3.02 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.
- 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.
- I. Secure fasteners according to manufacturer's recommended torque settings.
- J. Remove temporary supports.

### **3.03 NOT USED**

### **3.04 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**

**SECTION 26 05 33.13**  
**CONDUIT FOR ELECTRICAL SYSTEMS**

**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Galvanized steel rigid metal conduit (RMC).
- B. Liquidtight flexible metal conduit (LFMC).
- C. Electrical metallic tubing (EMT).
- D. Rigid polyvinyl chloride (PVC) conduit.
- E. Conduit fittings.
- F. Accessories.

**1.02 REFERENCE STANDARDS**

- A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC); 2015.
- 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); 2003.
- 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; 2005 (R2013).
- 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; 2015.
- J. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- 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.

**1.03 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.
  - 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 the 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.

#### 1.04 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.

#### 1.05 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

#### 2.01 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) conduit larger than 2 inch (53 mm) trade size is provided, use PVC-coated galvanized steel rigid metal conduit elbows for bends.
  - 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 on either side of where conduit emerges or use PVC-coated galvanized steel rigid metal conduit.
- 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, 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.
- 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 unless otherwise indicated.
  - 4. Vibrating equipment includes, but is not limited to:
    - a. Transformers.
    - b. Motors.
- N. Fished in Existing Walls, Where Necessary: Use flexible metal conduit.

## 2.02 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.

## 2.03 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.

## 2.04 NOT USED

## 2.05 NOT USED

## 2.06 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.

## 2.07 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.
  - 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.

## 2.08 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.

## 2.09 ACCESSORIES

- A. Corrosion Protection Tape: PVC-based, minimum thickness of 20 mil.
- B. Conduit Joint Compound: Corrosion-resistant, electrically conductive; suitable for use with the conduit to be installed.
- C. Solvent Cement for PVC Conduit and Fittings: As recommended by manufacturer of conduit and fittings to be installed.
- D. Pull Strings: Use nylon cord with average breaking strength of not less than 200 pound-force.

## PART 3 EXECUTION

### 3.01 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.
  - 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 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 between conduits and piping for other systems.
  11. Maintain minimum clearance of 12 inches 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.
    - 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.
  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.

- J. Underground Installation:
  - 1. Minimum Cover, Unless Otherwise Indicated or Required:
    - a. Underground, Exterior: 24 inches.
    - b. Under Slab on Grade: 12 inches to bottom of slab.
  - 2. Provide underground warning tape in accordance with Section 26 05 53 along entire conduit length.
- 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.
  - 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 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.

### 3.02 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.

**3.03 CLEANING**

- A. Clean interior of conduits to remove moisture and foreign matter.

**3.04 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****1.01 SECTION INCLUDES**

- A. Device boxes up to 100 cubic inches, including those used as junction and pull boxes.
- B. Cabinets and enclosures, including junction and pull boxes larger than 100 cubic inches.

**1.02 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); 2014.
- 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 - Industrial Control Panels; Current Edition, Including All Revisions.
- J. UL 514A - Metallic Outlet Boxes; Current Edition, Including All Revisions.

**1.03 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 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.
  - 8. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

**1.04 SUBMITTALS**

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets for floor boxes and underground boxes/enclosures.

**1.05 QUALITY ASSURANCE**

- A. Conform to requirements of NFPA 70.

## PART 2 PRODUCTS

### 2.01 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. Device Boxes Up to 100 cubic inches, Including Those Used as Junction and Pull Boxes:
  - 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.
  - 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.
  - 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.
- C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches:
  - 1. Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E, or UL 508A.
  - 2. NEMA 250 Environment Type, Unless Otherwise Indicated:
  - 3. Junction and Pull Boxes Larger Than 100 cubic inches:
    - a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.

## PART 3 EXECUTION

### 3.01 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.

- G. Box Locations:
1. Locate boxes to be accessible. Provide access panels in accordance with Section Access Panels as required where 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.
  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.
- 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.
- 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.

### 3.02 CLEANING

- A. Clean interior of boxes to remove dirt, debris, plaster and other foreign material.

### 3.03 PROTECTION

- A. Immediately after installation, protect boxes from entry of moisture and foreign material until ready for installation of conductors.

**END OF SECTION**

**SECTION 260553  
IDENTIFICATION FOR ELECTRICAL SYSTEMS**

**PART 1 GENERAL**

**1.01 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.

**1.02 RELATED REQUIREMENTS**

- A. Section 260519 - 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 262726 - Wiring Devices - Lutron: Device and wallplate finishes; factory pre-marked wallplates.

**1.03 REFERENCE STANDARDS**

- A. ANSI Z535.2 - American National Standard for Environmental and Facility Safety Signs 2011 (Reaffirmed 2017).
- B. ANSI Z535.4 - American National Standard for Product Safety Signs and Labels 2011 (Reaffirmed 2017).
- 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 2024.
- E. UL 969 - Marking and Labeling Systems Current Edition, Including All Revisions.

**1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Verify final designations for equipment, systems, and components to be identified prior to fabrication of identification products.
- B. Sequencing:
  - 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.

**1.05 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.

**1.06 QUALITY ASSURANCE**

- A. Comply with requirements of NFPA 70.

**1.07 FIELD CONDITIONS**

- A. Do not install adhesive products when ambient temperature is lower than recommended by manufacturer.

**PART 2 PRODUCTS****201 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.
      - 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.
    - 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:
1. Color Coding for Power Conductors 600 V and Less: Comply with Section 260519.
  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.
  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:
1. Wiring Device and Wallplate Finishes: Comply with Section 262726.
  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.

## **202 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; engraved text.
    - a. Exception: Provide minimum thickness of 1/8 inch when any dimension is greater than 4 inches.
  3. Stainless Steel Nameplates: Minimum thickness of 1/32 inch; engraved or laser-etched text.
  4. Aluminum Nameplates: Anodized; minimum thickness of 1/32 inch; engraved or laser-etched text.
  5. Mounting Holes for Mechanical Fasteners: Two, centered on sides for sizes up to 1 inch 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.
  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 by 2.5 inches.
  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.
    - b. Other Information: 1/4 inch.
  5. Color:
    - a. Normal Power System: White text on black background.
- D. Format for Caution and Warning Messages:
  1. Minimum Size: 2 inches by 4 inches.
  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.
  5. Color: Black text on yellow background unless otherwise indicated.
- E. Format for Receptacle Identification:
1. Minimum Size: 3/8 inch by 1.5 inches.
  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. Color: Black text on clear background.
- F. Format for Control Device Identification:
1. Minimum Size: 3/8 inch by 1.5 inches.
  2. Legend: Load controlled or other designation indicated.
  3. Text: All capitalized unless otherwise indicated.
  4. Minimum Text Height: 3/16 inch.
  5. Color: Black text on clear background.

### **203 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.
- F. Color: Black text on white background unless otherwise indicated.

### **204 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.
  3. Markers for Junction Boxes: 1/2 by 2 1/4 inches.
- D. Legend:
1. Markers for Voltage Identification: Highest voltage present.
- E. Color: Black text on orange background unless otherwise indicated.

## **205 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 wide, with minimum thickness of 4 mil.
- C. Legend: Type of service, continuously repeated over full length of tape.
- D. Color:

## **206 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 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 unless otherwise indicated.

## **PART 3 EXECUTION**

### **3.01 PREPARATION**

- A. Clean surfaces to receive adhesive products according to manufacturer's instructions.

### **3.02 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.
  - 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 below finished grade.
- G. Mark all handwritten text, where permitted, to be neat and legible.

### **3.03 FIELD QUALITY CONTROL**

- A. Replace self-adhesive labels and markers that exhibit bubbles, wrinkles, curling or other signs of improper adhesion.

**SECTION 260583  
WIRING CONNECTIONS**

**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Electrical connections to equipment.

**1.02 REFERENCE STANDARDS**

- A. NEMA WD 1 - General Color Requirements for Wiring Devices 1999 (Reaffirmed 2020).
- B. NEMA WD 6 - Wiring Devices - Dimensional Specifications 2021.
- C. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

**1.03 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Obtain and review shop drawings, product data, manufacturer's wiring diagrams, and manufacturer's instructions for equipment furnished under other sections.
  - 2. Determine connection locations and requirements.
- B. Sequencing:
  - 1. Install rough-in of electrical connections before installation of equipment is required.
  - 2. Make electrical connections before required start-up of equipment.

**1.04 QUALITY ASSURANCE**

- A. Comply with requirements of NFPA 70.
- B. Products: Listed, classified, and labeled as suitable for the purpose intended.
- C. 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****2.01 MATERIALS**

- A. Cords and Caps: NEMA WD 6; match receptacle configuration at outlet provided for equipment.
  - 1. Colors: Comply with NEMA WD 1.
  - 2. Cord Construction: NFPA 70, Type SO, multiconductor flexible cord with identified equipment grounding conductor, suitable for use in damp locations.

3. Size: Suitable for connected load of equipment, length of cord, and rating of branch circuit overcurrent protection.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that equipment is ready for electrical connection, wiring, and energization.

#### **3.02 ELECTRICAL CONNECTIONS**

- A. Make electrical connections in accordance with equipment manufacturer's instructions.
- B. Make conduit connections to equipment using flexible conduit. Use liquidtight flexible conduit with watertight connectors in damp or wet locations.
- C. Connect heat producing equipment using wire and cable with insulation suitable for temperatures encountered.
- D. Provide receptacle outlet to accommodate connection with attachment plug.
- E. Provide cord and cap where field-supplied attachment plug is required.
- F. Install suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.
- G. Install disconnect switches, controllers, control stations, and control devices to complete equipment wiring requirements.
- H. Install terminal block jumpers to complete equipment wiring requirements.
- I. Install interconnecting conduit and wiring between devices and equipment to complete equipment wiring requirements.

**SECTION 262200**  
**LOW-VOLTAGE TRANSFORMERS**

**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. General purpose transformers.

**1.02 RELATED REQUIREMENTS**

- A. Section 260526 - Grounding and Bonding for Electrical Systems.
- B. Section 260529 - Hangers and Supports for Electrical Systems.
- C. Section 260533.13 - Conduit for Electrical Systems: Flexible conduit connections.

**1.03 REFERENCE STANDARDS**

- A. 10 CFR 431, Subpart K - Energy Efficiency Program for Certain Commercial and Industrial Equipment - Distribution Transformers Current Edition.
- B. IEEE C57.94 - IEEE Recommended Practice for Installation, Application, Operation, and Maintenance of Dry-Type Distribution and Power Transformers 2015.
- C. IEEE C57.96 - IEEE Standard Guide for Loading Dry-Type Distribution and Power Transformers 2013.
- D. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- E. NECA 409 - Standard for Installing and Maintaining Dry-Type Transformers 2015.
- F. NEMA ST 20 - Dry Type Transformers for General Applications 2021.
- G. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.
- H. NETA ATS - Standard For Acceptance Testing Specifications For Electrical Power Equipment And Systems 2021.
- I. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- J. UL 506 - Standard for Specialty Transformers Current Edition, Including All Revisions.
- K. UL 1561 - Standard for Dry-Type General Purpose and Power Transformers Current Edition, Including All Revisions.

**1.04 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.

### **1.05 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.

### **1.06 QUALITY ASSURANCE**

- A. Comply with 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.

### **1.07 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**

### **201 MANUFACTURERS**

- A. Eaton Corporation: [www.eaton.com](http://www.eaton.com).
- B. Schneider Electric: [www.se.com/#sle](http://www.se.com/#sle).
- C. Siemens Industry, Inc: [www.usa.siemens.com](http://www.usa.siemens.com).
- D. Source Limitations: Provide transformers produced by same manufacturer as other electrical distribution equipment used for project and obtained from single supplier.

**202 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.
  - 2. Ambient Temperature:
    - a. Greater than 10 kVA: Not exceeding 104 degrees F.
    - b. Less than 10 kVA: Not exceeding 77 degrees F.
- 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 laminations to prevent plate movement and maintain consistent pressure throughout core length.
- D. Impregnate core and coil assembly with non-hygroscopic 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.

**203 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:
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.

## **204 SOURCE QUALITY CONTROL**

- A. Factory test transformers according to NEMA ST 20.

## **PART 3 EXECUTION**

### **301 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 260533.13, 2 feet 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 260529, where not furnished by transformer manufacturer.
  - 2. Use integral transformer flanges to support wall-mounted transformers.
  - 3. Unless otherwise indicated, mount floor-mounted transformers on properly sized 3 inch high concrete pad constructed in accordance with Section 033000.
  - 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 260526.
- 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.

### **3.02 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.

### **3.03 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.

### **3.04 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.

**SECTION 262416  
PANELBOARDS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Lighting and appliance panelboards.
- B. Overcurrent protective devices for panelboards.

**1.02 RELATED REQUIREMENTS**

- A. Section 260526 - Grounding and Bonding for Electrical Systems.
- B. Section 260529 - Hangers and Supports for Electrical Systems.
- C. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

**1.03 REFERENCE STANDARDS**

- A. FS W-C-375 - Circuit Breakers, Molded Case; Branch Circuit and Service 2013e, with Amendment (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) 2020.
- 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 - Standard For Acceptance Testing Specifications For Electrical Power Equipment And Systems 2021.
- 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.
- M. UL 943 - Ground-Fault Circuit-Interrupters Current Edition, Including All Revisions.

**1.04 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.

**1.05 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.

**1.06 QUALITY ASSURANCE**

- A. Comply with requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- 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.

**1.07 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**

### **201 MANUFACTURERS**

- A. ABB/GE: [www.electrification.us.abb.com/#sle](http://www.electrification.us.abb.com/#sle).
- B. Eaton Corporation: [www.eaton.com](http://www.eaton.com).
- C. Schneider Electric; Square D Products: [www.schneider-electric.us](http://www.schneider-electric.us).
- D. Siemens Industry, Inc: [www.usa.siemens.com](http://www.usa.siemens.com).
- E. Source Limitations: Provide panelboards and associated components produced by same manufacturer as other electrical distribution equipment used for project and obtained from a single supplier.

### **202 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. Ambient Temperature:
    - a. Panelboards Containing Circuit Breakers: Between 23 degrees F and 104 degrees F.
- C. Short Circuit Current Rating:
  - 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. Indoor Clean, Dry Locations: Type 1.
    - b. 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.

### **203 LIGHTING AND APPLIANCE PANELBOARDS**

- A. Description: Panelboards complying with NEMA PB 1, lighting and appliance branch circuit type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.
- 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 Bus Connections: Arranged for sequential phasing of overcurrent protective devices.
  - 2. Phase and Neutral Bus Material: Copper.
  - 3. Ground Bus Material: Copper.
- D. Circuit Breakers: Thermal magnetic bolt-on type unless otherwise indicated.
- E. Enclosures:

1. Provide surface-mounted or flush-mounted enclosures as 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.

## 204 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.
  - 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. Multi-Pole Circuit Breakers: Furnish with common trip for all poles.
6. Provide the following circuit breaker types where indicated:
  - a. Ground Fault Circuit Interrupter (GFCI) Circuit Breakers: Listed as complying with UL 943, class A for protection of personnel.
7. Do not use tandem circuit breakers.
8. Provide multi-pole circuit breakers for multi-wire branch circuits as required by NFPA 70.
9. Provide the following features and accessories where indicated or where required to complete installation:
  - a. Shunt Trip: Provide coil voltage as required for connection to indicated trip actuator.
  - b. Handle Pad-Lock Provision: For locking circuit breaker handle in OFF position.

**PART 3 EXECUTION****3.01 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.

**3.02 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 260529.
- F. Install panelboards plumb.
- 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 above the floor or working platform.
- I. Provide minimum of six spare 1 inch 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 260526.
- 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.

**3.03 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. Test GFCI circuit breakers to verify proper operation.

- D. Test shunt trips to verify proper operation.
- E. Correct deficiencies and replace damaged or defective panelboards or associated components.

**3.04 ADJUSTING**

- A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.
- B. Adjust alignment of panelboard fronts.

**3.05 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.

NOT FOR BID

**SECTION 265100  
INTERIOR LIGHTING**

**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Interior luminaires.
- B. Emergency lighting units.
- C. Exit signs.
- D. Ballasts and drivers.

**1.02 REFERENCE STANDARDS**

- A. IES LM-63 - Approved Method: IES Standard File Format for the Electronic Transfer of Photometric Data and Related Information 2019.
- B. IESNA LM-63 - ANSI Approved Standard File Format for Electronic Transfer of Photometric Data and Related Information 2002 (Reaffirmed 2008).
- C. IES LM-79 - Approved Method: Optical and Electrical Measurements of Solid-State Lighting Products 2019.
- D. IES LM-80 - Approved Method: Measuring Maintenance of Light Output Characteristics of Solid-State Light Sources 2021.
- E. NECA/IESNA 500 - Standard for Installing Indoor Lighting Systems 2006.
- F. NECA/IESNA 502 - Standard for Installing Industrial Lighting Systems 2006.
- G. NEMA LE 4 - Recessed Luminaires, Ceiling Compatibility 2012 (Reaffirmed 2018).
- H. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- I. NFPA 101 - Life Safety Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- J. UL 924 - Emergency Lighting and Power Equipment Current Edition, Including All Revisions.
- K. UL 1598 - Luminaires Current Edition, Including All Revisions.
- L. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products Current Edition, Including All Revisions.

**1.03 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.

#### **1.04 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 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. Certificates for Dimming Ballasts: Manufacturer's documentation of compatibility with dimming controls to be installed.**

##### **D. Operation and Maintenance Data: Instructions for each product including information on replacement parts.**

##### **E. 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.
- F. Project Record Documents: Record actual connections and locations of luminaires and any associated remote components.

### **1.05 QUALITY ASSURANCE**

- A. Comply with requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

### **1.06 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.

### **1.07 FIELD CONDITIONS**

- A. Maintain field conditions within manufacturer's required service conditions during and after installation.

### **1.08 WARRANTY**

- A. Provide five year manufacturer warranty for all LED luminaires, including drivers.
- B. Provide 5-year pro-rata warranty for batteries for emergency lighting units.

## **PART 2 PRODUCTS**

### **2.01 LUMINAIRE TYPES**

- A. Furnish products as indicated in luminaire schedule included on the drawings.

### **2.02 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.

- 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.

### **203 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.

### **204 EXIT SIGNS**

- A. Description: Exit signs complying with NFPA 101 and applicable state and local codes, and listed and labeled as complying with UL 924.
  - 1. Number of Faces: Single- or double-face as indicated or as required for installed location.
  - 2. Directional Arrows: As indicated or as required for installed location.

### **205 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.
- B. Dimmable LED Drivers:
1. Dimming Range: Continuous dimming from 100 percent to one 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**

### **3.01 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.

### **3.02 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.

### **3.03 INSTALLATION**

- A. Coordinate locations of outlet boxes provided under Section 260533.16 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 260529.
- 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.
  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 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.
- 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.

**3.04 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.

**3.05 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.

**3.06 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.

**3.07 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.

**3.08 PROTECTION**

- A. Protect installed luminaires from subsequent construction operations.

**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 31 2200 - Grading: Topsoil removal.
- C. Section 31 2323 - Fill and Backfill: Fill material for filling holes, pits, and excavations generated as a result of removal operations.

**1.03 PROJECT CONDITIONS**

- A. Conform to applicable regulations relating to environmental requirements, disposal of debris and use of herbicides.
- B. Coordinate clearing work with utility companies.
- C. Protect bench marks, survey control points, and existing structures from damage or displacement.

**PART 2 PRODUCTS****2.01 -- NOT APPLICABLE --****PART 3 EXECUTION****3.01 PREPARATION**

- A. Locate and identify utilities to remain.
- B. Verify existing plants designated to remain are tagged or identified.

**3.02 PROTECTION**

- A. Tag existing plants designated to remain.
- B. Protect utilities that remain from damage. All existing utilities to remain should be located and flagged.
- C. Protect trees, plant growth, and features designated to remain as final landscaping.
- D. Protect bench marks and lot corner monumentation from damage or displacement.

**3.03 SITE CLEARING**

- A. Comply with other requirements specified in Section 01 7000 - "Execution Requirements".
- B. Clear areas required for access to site and execution of work.
- C. Minimize production of dust due to clearing operations; do not use water if that will result in flooding, sedimentation of public waterways or storm sewers, or other pollution.
- D. Remove trees, shrubs and stumps indicated. All excavation should be conducted in a manner not to cause loss of bearing and/or lateral support of existing structures or utilities.
- E. Clear surface vegetation, undergrowth and deadwood without disturbing subsoil.
- F. Remove surficial soils containing roots and perishable materials.
- G. Abandoned underground utilities lines should be traced out and completely removed. Cap ends as indicated on Civil Demolition drawings.

**3.04 DEBRIS**

- A. Remove existing loose soil, vegetation, debris and other unsuitable materials for all building, slab and pavement areas and all other graded surfaces.
- 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.
- B. Rough grading the site for site structures, building pads, and parking areas.
- C. Finish grading .

**1.02 RELATED REQUIREMENTS**

- A. Section 31 1000 - Site Clearing.
- B. Section 31 2316 - Excavation.
- C. Section 31 2323 - Fill and Backfill: Filling and compaction.

**1.03 SUBMITTALS**

- A. See Section 01 3000 - Submittals for submittal procedures.
- B. B. Samples: Submit 10-lb sample of each type of fill to testing laboratory in air tight containers.

**1.04 QUALITY ASSURANCE**

- A. Perform Work in accordance with the plans and these specifications.

**1.05 1.05 PROJECT RECORD DOCUMENTS****1.06 A. ACCURATELY RECORD ACTUAL LOCATIONS OF UTILITIES REMAINING BY HORIZONTAL DIMENSIONS, ELEVATIONS OR INVERTS AND SLOPE GRADIENTS****PART 2 PRODUCTS****2.01 MATERIALS**

- A. Topsoil - Soil Type : Topsoil excavated on-site.
  - 1. Graded.
  - 2. Free of roots, rocks larger than 1/2 inch, subsoil, debris, large weeds and foreign matter.
- B. Other Fill Materials: See Section 31 2323.

**PART 3 EXECUTION****3.01 EXAMINATION**

- A. Verify that survey bench mark and intended elevations for the Work are as indicated.
- B. Verify site conditions.

**3.02 PREPARATION**

- A. Identify required lines, levels, contours, and datum.
- B. Protect bench marks, existing structures, sidewalks, pavements and curbs from excavating equipment and vehicular traffic.
- C. Stake and flag locations of known underground, above ground and aerial utilities.
- D. Protect above and below grade utilities which are to remain.
- E. Notify utility company to remove, rebuild or relocate utilities.

**3.03 ROUGH GRADING**

- A. Remove topsoil from areas to be further excavated, re-landscaped, or re-graded, without mixing with foreign materials.
- B. Do not remove topsoil when wet.
- C. Remove subsoil from areas to be further excavated, re-landscaped, or re-graded.

- D. Do not remove wet subsoil, unless it is subsequently processed to obtain optimum moisture content.
- E. When excavating through roots, perform work by hand and cut roots with sharp axe.
- F. Stability: Replace damaged or displaced subsoil to same requirements as for specified fill.

### **3.04 SOIL REMOVAL**

- A. Stockpile excavated topsoil on site.
- B. Stockpile topsoil to be re-used on site; remove remainder from site.
- C. Remove excavated topsoil from site.
- D. Stockpile excavated subsoil on site.
- E. Stockpile subsoil to be re-used on site; remove remainder from site.
- F. Remove excavated subsoil from site.
- G. Stockpiles: Use areas designated on site; pile depth not to exceed 8 feet; protect from erosion.

### **3.05 FINISH GRADING**

- A. Before Finish Grading:
  - 1. Verify building and trench backfilling have been inspected.
  - 2. Verify subgrade has been contoured and compacted.
- B. Remove debris, roots, branches, stones, in excess of 1/2 inch in size. Remove soil contaminated with petroleum products.
- C. In areas where vehicles or equipment have compacted soil, scarify surface to depth of 3 inches.
- D. Fine grade topsoil to eliminate uneven areas and low spots. Maintain profiles and contour of subgrade.

### **3.06 TOLERANCES**

- A. Top Surface of Subgrade: Plus or minus 1/2 inch from required elevation.
- B. Top Surface of Finish Grade: Plus or minus 1/4 inch from required elevation.

### **3.07 FIELD QUALITY CONTROL**

- A. See Section 31 2323 for compaction density testing.

### **3.08 CLEANING**

- A. Remove unused stockpiled topsoil and subsoil. Grade stockpile area to prevent standing water.
- B. Leave site clean and raked, ready to receive landscaping.

**END OF SECTION**

**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 57 13 - Temporary Erosion Control.
- B. Section 01 7000 - Execution Requirements: General requirements for dewatering of excavations and water control.
- C. Section 31 22 00 - Grading: Grading.
- D. Section 31 2323 - Fill and Backfill: Fill materials, filling, and compacting.

**PART 2 PRODUCTS****2.01 -- NOT APPLICABLE --****PART 3 EXECUTION****3.01 PREPARATION**

- A. Identify required lines, levels, contours, and datum locations.
- B. See Section 31 2200 for additional requirements.
- C. Locate, identify, and protect utilities that remain and protect from damage.

**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 45 00 - "Quality Control", for general requirements for field inspection and testing.
- B. Provide for visual inspection of load-bearing excavated surfaces before placement of foundations.

**3.04 PROTECTION**

- A. Prevent displacement of banks and keep loose soil from falling into excavation; maintain soil stability.
- B. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.

**END OF SECTION**

**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.
- B. Section 32 1313 - Portland Cement Concrete Paving: Leveling bed placement under paving.
- C. Section 03 300 - Cast-in-Place Concrete.

**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/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)); 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/ft<sup>3</sup> (2,700 kN m/m<sup>3</sup>)); 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: That portion on which pavement, concrete, surfacing, base, subbase, or a layer of other material is placed.. For structures, the soil prepared to support the structure.

**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.
  - 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 - Onsite excavated materials are generally considered acceptable.
- B. General Fill: Subsoil excavated on-site.
  - 1. Rocks larger than 1 inch in the largest dimension should not be placed within the upper 12 inches of fill beneath footings and slabs or the upper 18 inches under paved areas.
- C. Structural Fill: Conforming to State of California Department of Transportation standard.
- D. Structural Fill: Subsoil excavated on-site.
  - 1. Graded.
  - 2. Free of lumps larger than 3 inches, rocks larger than 1 inch, and debris.
- E. Concrete for Fill: Lean concrete, 1 or 2 sack slurry.
- F. Granular Fill: Coarse aggregate, conforming to State of California Department of Transportation standard.
- G. Sand: Conforming to State of California Department 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. See Section 31 2200 for additional requirements.
- C. Final bottom surfaces of all excavations should be observed and approved by the project geotechnical engineer prior to placement of fill.

### **3.02 PREPARATION**

- A. All structures and pavements should be uniformly supported by compacted fill.
- B. Building footprints and all other structures should over-excavated to at least 5 feet below the bottom of footings.
- C. Over-excavations should extend at least 5 feet beyond the structure footprint.
- D. Depth of over-excavation should be uniform across the entire structure.
- E. Pavement and flatwork areas should be over-excavated at least 1 foot below subgrade
- F. Over-excavation should extend at least 1 foot beyond the edge of paved areas.
- G. Scarify over-excavated bottoms to additional depth of 6 inches
- H. Moisture condition scarified surface:
  - I. 1. Coarse-grained materials: Within 3 percent of optimum moisture content.
  - J. 2. Fine-grained materials: 0 to 2 percent of optimum moisture content.
- K. Surface should be re-compacted to at least 90 percent of laboratory maximum dry density.

### **3.03 FILLING**

- A. Fill to contours and elevations indicated.
- B. Employ a placement method that does not disturb or damage other work.
- C. 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. 1. Coarse-grained materials: Within 3 percent of optimum moisture content.

- F. 2. Fine-grained materials: 0 to 2 percent of optimum moisture content.
- G. Granular Fill: Place and compact materials in equal continuous layers not exceeding 8 inches compacted depth. Compact to at least 90 percent of laboratory maximum dry density as determined by ASTM Standard D1557.
- H. Slope grade away from building minimum 0.5 feet in 10 feet on pervious surfaces and 0.2 feet in 10 on impervious surfaces, unless noted otherwise. Make gradual grade changes. Blend slope into level areas.
- I. 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.
- J. Compaction Density Unless Otherwise Specified or Indicated:
  - 1. Under paving, slabs-on-grade, and similar construction: 95 percent of maximum dry density at 12 inches below subgrade.
- K. Reshape and re-compact fills subjected to vehicular traffic.

### **3.04 FIELD QUALITY CONTROL**

- A. See Section 01 45 00 - "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.

### **3.05 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**

**SECTION 32 1313  
CONCRETE PAVING****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Concrete sidewalks and parking areas.

**1.02 RELATED REQUIREMENTS**

- A. Section 03 3000 - Cast-in-Place Concrete.
- B. Section 07 9200 - Joint Sealants: Sealing joints.
- C. Section 31 2200 - Grading: Preparation of site for paving and base and preparation of subsoil at pavement perimeter for planting.

**1.03 REFERENCE STANDARDS**

- A. ACI 211.1 - Selecting Proportions for Normal-Density and High Density-Concrete - Guide; 2022.
- B. ACI 301 - Specifications for Concrete Construction; 2020.
- C. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; 2000 (Reapproved 2009).
- D. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2022.
- E. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2023.
- F. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2023.
- G. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete; 2019.
- H. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete; 2019, with Editorial Revision (2022).
- I. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Asphalt Types); 2023.
- J. ASTM D1752 - Standard Specification for Preformed Sponge Rubber, Cork, and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction; 2018 (Reapproved 2023).
- K. PCA-PA124- Finishing Concrete with Color and Texture.

**1.04 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on joint filler and curing compound.

**PART 2 PRODUCTS****2.01 PAVING ASSEMBLIES**

- A. Comply with applicable requirements of ACI 301.
- B. Concrete Sidewalks and Median Barrier: 3,000 psi 28 day concrete, 4 inches thick, buff color Portland cement, exposed aggregate finish.

**2.02 AGGREGATE BASE**

- A. Aggregate Base Course: Thickness and size of aggregate as indicated on the drawings.

**2.03 FORM MATERIALS**

- A. Wood form material, profiled to suit conditions.
- B. Joint Filler: Preformed; non-extruding bituminous type (ASTM D1751) or sponge rubber or cork (ASTM D1752).

**2.04 REINFORCEMENT**

- A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi) yield strength; deformed billet steel bars; unfinished.

**2.05 CONCRETE MATERIALS**

- A. Obtain cementitious materials from same source throughout.
- B. Concrete Materials: As specified in Section 03 3000.
- C. Fiber Reinforcement: Synthetic fibers shown to have long-term resistance to deterioration when in contact with alkalis and moisture; 1/2 inch length.
- D. Admixtures: Fly ash is not allowed.

**2.06 ACCESSORIES**

- A. Curing Compound: ASTM C309, Type 1, Class A.
- B. Surface Retarder:
  - 1. Color: As selected by Architect from manufacturer's standard range.
- C. Slab Isolation Joint Filler: 1/2 inch thick, height equal to slab thickness, with removable top section that will form 1/2 inch deep sealant pocket after removal.
  - 1. Material: ASTM D1751, cellulose fiber.

**2.07 CONCRETE MIX DESIGN**

- A. Concrete Strength: Establish required average strength for each type of concrete on the basis of field experience or trial mixtures, as specified in ACI 301.
  - 1. For trial mixtures method, employ independent testing agency acceptable to Architect for preparing and reporting proposed mix designs.
- B. Fiber Reinforcement: Add to mix at rate of 1.5 pounds per cubic yard, or as recommended by manufacturer for specific project conditions.
- C. Concrete Properties:
  - 1. Compressive strength, when tested in accordance with ASTM C39/C39M at 28 days; 4,000 psi.

**2.08 MIXING**

- A. Transit Mixers: Comply with ASTM C94/C94M.

**PART 3 EXECUTION****3.01 EXAMINATION**

- A. Verify compacted subgrade is acceptable and ready to support paving and imposed loads.
- B. Verify gradients and elevations of base are correct.
- C. Verify base conditions.

**3.02 PREPARATION**

- A. Moisten base to minimize absorption of water from fresh concrete.
- B. Notify Architect 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 joint filler vertical in position, in straight lines. Secure to formwork during concrete placement.

**3.04 PLACING CONCRETE**

- A. Place concrete in accordance with ACI 304R.
- B. Ensure reinforcement, inserts, embedded parts, 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.

### 3.05 JOINTS

- A. Place 3/8 inch wide expansion joints at 30 foot intervals and to separate paving from vertical surfaces and other components and in pattern indicated.
- B. Provide scored joints.
  - 1. At 5 feet intervals.
- C. Saw cut contraction joints 3/16 inch wide at an optimum time after finishing. Cut 1/3 into depth of slab, at 8'-0" O.C.

### 3.06 FINISHING

- A. Area Paving: Light broom, texture perpendicular to pavement direction.
- B. Sidewalk Paving: Light broom, texture perpendicular to direction of travel with troweled and radiused edge 1/4 inch radius.
- C. Place curing compound on exposed concrete surfaces immediately after finishing. Apply in accordance with manufacturer's instructions.

### 3.07 JOINT SEALING

- A. See Section 07 9005 for joint sealer requirements.
- B. 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.

### 3.08 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.

### 3.09 PROTECTION

- A. Immediately after placement, protect pavement from premature drying, excessive hot or cold temperatures, and mechanical injury.

**END OF SECTION**

**SECTION 32 1713  
WHEEL STOPS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Precast concrete parking bumpers and anchorage.

**1.02 REFERENCE STANDARDS**

- A. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2022.
- B. ASTM C150/C150M - Standard Specification for Portland Cement; 2022.
- C. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete; 2010a (Reapproved 2016).
- D. ASTM C330/C330M - Standard Specification for Lightweight Aggregates for Structural Concrete; 2023.

**PART 2 PRODUCTS****2.01 MATERIALS**

- A. Parking Bumpers: Precast concrete, complying with the following.
  - 1. Nominal Size: 5 inches high, 9 inches wide, 6 feet long.
  - 2. Cement: ASTM C150/C150M, Portland Type I - Normal; white color.
  - 3. Concrete Materials: ASTM C330/C330M aggregate, water, and sand.
  - 4. Reinforcing Steel: ASTM A615/A615M, deformed steel bars; unfinished, strength and size commensurate with precast unit design.
  - 5. Air Entrainment Admixture: ASTM C260/C260M.
  - 6. Concrete Mix: Minimum 5,000 psi compressive strength after 28 days, air entrained to 5 to 7 percent.
  - 7. Use rigid molds, constructed to maintain precast units uniform in shape, size and finish. Maintain consistent quality during manufacture.
  - 8. Embed reinforcing steel, and drill or sleeve for two dowels.
  - 9. Cure units to develop concrete quality, and to minimize appearance blemishes such as non-uniformity, staining, or surface cracking.
  - 10. 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**

**SECTION 32 1723  
PAVEMENT MARKINGS**

**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Painted pavement markings.

**1.02 RELATED REQUIREMENTS**

- A. Section 32 1216 - Asphalt Paving.
- B. Section 32 1313 - Concrete Paving.
- C. Section 32 1726 - Tactile Warning Surfacing.

**1.03 REFERENCE STANDARDS**

- A. AASHTO M 249 - Standard Specification for White and Yellow Reflective Thermoplastic Striping Material (Solid Form); 2012 (Reapproved 2020).
- B. AASHTO MP 24 - Standard Specification for Waterborne White and Yellow Traffic Paints; 2015 (Reapproved 2020).

**1.04 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used.

**PART 2 PRODUCTS****2.01 PAINTED PAVEMENT MARKINGS**

- A. Comply with State of California Highway Department standards.
- B. Painted Pavement Markings: As indicated on drawings.
  - 1. Marking Paint: In accordance with AASHTO MP 24.
    - a. Parking Lots: White.
    - b. Wheelchair Symbols: Provide blue and white.

**PART 3 EXECUTION****3.01 EXAMINATION**

- A. Verification of Conditions: Verify that pavement is dry and ready for installation.
- B. Notify Architect of unsatisfactory conditions before proceeding.

**3.02 PREPARATION**

- A. Clean surfaces prior to installation.
  - 1. Remove dust, dirt, and other debris.
- B. Apply paint stencils by type and color at necessary intervals.

**3.03 INSTALLATION**

- A. General:
  - 1. Position pavement markings as indicated on drawings.
  - 2. Field location adjustments require approval of Architect.
- B. Painted Pavement Markings:
  - 1. Apply in accordance with manufacturer's instructions.
  - 2. Apply in accordance with State of California Highway Department standards.
  - 3. Marking Paint: Apply uniformly, with sharp edges.
    - a. Applications: One coat.
    - b. Wet Film Thickness: 0.015 inch, minimum.
    - c. Stencils: Lay flat against pavement, align with striping, remove after application.

**3.04 FIELD QUALITY CONTROL**

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

- B. Allow the pavement marking to set at least the minimum time recommended by manufacturer.

**3.05 PROTECTION**

- A. Prevent approaching traffic from crossing newly applied pavement markings.
- B. Replace damaged or removed markings at no additional cost to Owner.

**END OF SECTION**

NOT FOR BID

**SECTION 32 1726  
TACTILE WARNING SURFACING**

**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Plastic tactile and detectable warning tiles for pedestrian walking surfaces.

**1.02 RELATED REQUIREMENTS**

- A. Section 03 3000 - Cast-in-Place Concrete: Concrete for sidewalks and platforms.
- B. Section 32 1313 - Concrete Paving: Concrete sidewalks.

**1.03 REFERENCE STANDARDS**

- A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.
- B. ASTM C501 - Standard Test Method for Relative Resistance to Wear of Unglazed Ceramic Tile by the Taber Abraser; 2021.
- C. ASTM D2047 - Standard Test Method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine; 2017.
- D. ASTM D638 - Standard Test Method for Tensile Properties of Plastics; 2022.
- E. ASTM D695 - Standard Test Method for Compressive Properties of Rigid Plastics; 2023.
- F. ASTM D790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials; 2017.
- G. ASTM D1308 - Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Coating Systems; 2020.
- H. SAE AMS-STD-595 - Colors Used in Government Procurement; 2017a.

**1.04 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Submit manufacturer's product data, standard details, details specific to this project; written installation and maintenance instructions.
- C. Samples: For each product specified provide two samples, 8 inches square, minimum; show actual product, color, and patterns.
- D. Shop Drawings: Submit plan and detail drawings. Indicate:
  - 1. Locations on project site. Demonstrate compliance with referenced accessibility standards.
  - 2. Sizes and layout.
  - 3. Pattern spacing and orientation.
  - 4. Attachment and fastener details, if applicable
- E. Warranty: Submit manufacturer warranty; complete forms in Owner's name and register with manufacturer.

**1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than five years documented experience.
- B. Installer Qualifications: Company certified in writing by product manufacturer as having successfully completed work substantially similar to the work of this section.

**1.06 WARRANTY**

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Plastic Tiles: Provide manufacturer's standard five year warranty against manufacturing defects, breakage or deformation.

**PART 2 PRODUCTS****2.01 MANUFACTURERS**

- A. Plastic Tactile and Detectable Warning Surface Tiles:
1. Access Tile, a brand of Access Products, Inc; -: [www.accesstile.com/#sle](http://www.accesstile.com/#sle).
  2. Armor-Tile, a brand of Engineered Plastics, Inc; -: [www.armortiletransit.com](http://www.armortiletransit.com).
  3. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

## 2.02 TACTILE AND DETECTABLE WARNING DEVICES

- A. Plastic Tactile and Detectable Warning Tiles: ADA Standards compliant, glass fiber and carbon fiber reinforced, exterior grade, matte finish polyester sheet with truncated dome pattern, solid color throughout, internal reinforcing of sheet and of truncated domes, integral radius cut lines on back face of tile; with factory-applied removable protective sheeting.
1. Material Properties:
    - a. Water Absorption: 0.20 percent, maximum, when tested in accordance with ASTM D570.
    - b. Slip Resistance: 0.50 minimum dry static coefficient of friction, when tested in accordance with ASTM D2047.
    - c. Compressive Strength: 25,000 pounds per square inch, minimum, when tested in accordance with ASTM D695.
    - d. Tensile Strength: 10,000 pounds per square inch, minimum, when tested in accordance with ASTM D638.
    - e. Flexural Strength: 25,000 pounds per square inch minimum, when tested in accordance with ASTM D790.
    - f. Chemical Stain Resistance: No reaction to 1 percent hydrochloric acid, motor oil, calcium chloride, gum, soap solution, bleach, or antifreeze, when tested in accordance with ASTM D543.
    - g. Chemical Stain Resistance: No reaction to 1 percent hydrochloric acid, motor oil, calcium chloride, gum, soap solution, bleach, or antifreeze, when tested in accordance with ASTM D1308.
    - h. Abrasion Resistance: 300, minimum, when tested in accordance with ASTM C501.
    - i. Flame Spread Index: 25, maximum, when tested in accordance with ASTM E84.
    - j. Accelerated Weathering: Delta-E of less than 5.0 at 2,000 hours exposure, when tested in accordance with ASTM G155.
    - k. Salt and Spray Performance: No deterioration or other defect after 200 hours of exposure, when tested in accordance with ASTM B117.
  2. Installation Method: Surface applied.
  3. Shape: Rectangular.
  4. Dimensions: 36 inches by 48 inches.
  5. Pattern: In-Line pattern of truncated domes complying with California Building Code 11B-705.
  6. Edge: Beveled edge per California Building Code 11B-303.3..
  7. Color: SAE AMS-STD-595, Table IV, Federal Yellow No. 33538.

## 2.03 ACCESSORIES

- A. Fasteners: ASTM A666, Type 304 stainless steel
1. Type: Countersunk, color matched composite sleeve anchors
  2. Size: 1/4 inch diameter and 1-1/2 inches long.
- B. Adhesive: Type recommended and approved by surfacing tile manufacturer.
- C. Sealant: Elastomeric sealant of color to match adjacent surfaces; approved by surfacing tile manufacturer.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. When installation location is near site boundary or property line, verify required location using property survey.
- B. Verify that work area is ready to receive work:

1. If existing conditions are not as required to properly complete the work of this section, notify Architect.
  2. Do not proceed with installation until deficiencies in existing conditions have been corrected.
- C. Verify that dimensions, tolerances, and attachment methods for work in this section are properly coordinated with other work on site.

### **3.02 INSTALLATION, GENERAL**

- A. Install in accordance with manufacturer's written instructions.
1. Do not install damaged, warped, bowed, dented, abraded, or otherwise defective units.
  2. Do not install when ambient or substrate temperature has been below 40 degrees F during the preceding 8 daylight hours.
  3. Install in accordance with the California Building Code chapter 11B.
- B. Field Adjustment:
1. Cut units to size and configuration shown on drawings.
  2. Do not cut plastic tiles to less than 9 inches wide in any direction.
  3. Locate relative to curb line in compliance with ATBCB PROWAG, Sections 304 and 305.
  4. Orient so dome pattern is aligned with the direction of ramp.
  5. Align truncated dome pattern between adjacent units.
- C. Install units fully seated to substrate, square to straight edges and flat to required slope.
- D. Align units so that tops of adjacent units are flush and joints between units are uniform in width.

### **3.03 INSTALLATION, SURFACE APPLIED PLASTIC TILES**

- A. Cure concrete surfaces for a minimum of 4 days before installing units.
- B. When installing multiple adjacent units, leave a 1/8 inch gap between tiles to allow for expansion.
- C. Drill fastener holes straight, true and to depth recommended by manufacturer.
- D. Apply adhesive to back of unit as recommended by manufacturer.
- E. Mechanically fasten to substrate. Avoid striking or damaging the unit itself during installation.
- F. Apply sealant to edges in cove profile.

### **3.04 CLEANING PLASTIC UNITS**

- A. Remove protective plastic sheeting within 24 hours of installation.
- B. Remove excess sealant or adhesive from joints and edges.
- C. Clean four days prior to date of scheduled inspection.

### **3.05 PROTECTION**

- A. Protect installed units from traffic, subsequent construction operations or other imposed loads until concrete is fully cured.
- B. Touch-up, repair or replace damaged products prior to Date of Substantial Completion.

**END OF SECTION**

**SECTION 32 3100  
PIPE FENCES AND GATES**

**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Posts, rails, and frames.
- B. Manual gates with related hardware.

**1.02 RELATED REQUIREMENTS**

- A. Section 03 3000 - Cast-in-Place Concrete: Concrete anchorage for posts.

**1.03 REFERENCE STANDARDS**

- A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.
- B. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2023.
- C. ASTM F1083 - Standard Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures; 2018 (Reapproved 2022).

**1.04 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on 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.

**PART 2 PRODUCTS****2.01 MANUFACTURERS**

- A. Pipe Horse Fence (Arena fencing):
  - 1. Castlebrook Barns
  - 2. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

**2.02 MATERIALS**

- A. Posts, Rails, and Frames: ASTM F1083 Schedule 40 hot-dipped galvanized steel pipe, welded construction, minimum yield strength of 30 ksi.
- B. Concrete: Ready-mixed, complying with ASTM C94/C94M; normal Portland cement; 2,500 psi strength at 28 days, 3 inch slump; .75 inch nominal size aggregate.

**2.03 COMPONENTS**

- A. Drive posts: 2-3/8 inch diameter x .065" x 8 feet, galvanized steel.
- B. Fence panel: 5 rail and 4 rail, 1-7/8 inch 16 gauge galv. steel pipe.
- C. Gate frame: 1-5/8 inch 16 ga. galv. steel pipe.

**2.04 MANUAL GATES AND RELATED HARDWARE**

- A. Hardware for Single Swinging Gates: 180 degree hinges, 2 for gates up to 60 inches high, 3 for taller gates; fork latch with gravity drop and padlock hasp.
  - 1. Gate chain with clip.
  - 2. Gate Hinge: Heavy duty galvanized steel
    - a. Master Halco 014106 frame hinge, matching post hinge.

**2.05 FINISHES**

- A. Hardware: Hot-dip galvanized to weight required by ASTM A153/A153M.
- B. Accessories: Same finish as framing.

**PART 3 EXECUTION****3.01 EXAMINATION**

- A. Verification of Conditions: Verify that areas are clear of obstructions or debris.

### **3.02 PREPARATION**

- A. Removal: Obstructions or debris.
- B. Ground Preparation: See Civil.

### **3.03 INSTALLATION**

- A. Install framework, fabric, accessories and gates in accordance with ASTM F567.
- B. Install Dive posts. Embed in concrete as indicated.
- C. Install Fence Panels as indicated in plans.
- D. Install bottom tension wire stretched taut between terminal posts.

### **3.04 TOLERANCES**

- A. Maximum Variation From Plumb: 1/4 inch.
- B. Maximum Offset From True Position: 1 inch.

### **3.05 FIELD QUALITY CONTROL**

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Layout: Verify that fence installation markings are accurate to design, paying attention to gate locations, underground utilities, and property lines.
- C. Post Settings: Randomly inspect three locations against design for:
  - 1. Hole diameter.
  - 2. Hole depth.
  - 3. Hole spacing.
- D. Fence Height: Randomly measure fence height at three locations or at areas that appear out of compliance with design.
- E. Gates: Inspect for level, plumb, and alignment.

**END OF SECTION**