DOCUMENT 00 91 13

ADDENDA

NOTICE TO ALL BIDDERS: THE FOLLOWING MODIFICATIONS, ADDITIONS, DELETIONS, CLARIFICATIONS AND/OR INFORMATION ARE HEREBY MADE PART OF THE CONTRACT DOCUMENTS. ADDENDUM MUST BE ACKNOWLEGDED AS PART OF THE BIF FORM.

1. RFI QUESTIONS

1) Is there an Engineers estimate?
   (a) $1,313,624.00

2) Will the District consider Silver tier Panduit Partners?
   (a) District will accept any valid and current Panduit Partner certification.

3) Will certificates need to be provided with bids?
   (a) NO. Certification will be verified directly with Panduit.

4) Due to safety concerns, can the rooftop work be done during the day shift just so as long as the noise is to a minimum and all safety precautions are in place?
   (a) Yes

5) During the walk it was noticed that some of the existing pathways are under slab (not necessarily underground). Shall we consider and small diameter I/O cable for these instances? An OSP cable may utilize too much space.
   (a) Not applicable to this site. Yes the I/o cable noted in 27 10 00 Appendix A is approved for under slab locations.

6) There is mention of owner installed camera's in the sheet notes. There is also a detail that shows an arm for mounting some of the cameras. Nothing is mentioned on the equipment schedule like there is on for speakers, i.e. backboxes. It is not clear on the drawings who is providing the arms/mounts, etc. for the CCTV cameras. It appears, the contractor is to provide the cat6 cable drop for the camera and that is all. Can this be confirmed?
   (a) All cameras and mounts are existing, except for RCP Sheet Note 17 locations which are new and OFCI. Sheet Note 17 locations require a contractor-provided backbox. All data drops and pathway are new. A revised Sheet T-000 is being provided to clarify this.

7) We are installing new 5400 Wiremold on this project and installing new data drops. There is no mention of reinstalling electrical outlets in this Wiremold. I'm pretty sure there are outlets in the existing Wiremold so when this is removed I'm assuming the power goes with it.
   (a) Note that bold/darker line indicates New Wiremold and grey line indicates Existing Wiremold. Electrical outlets in Existing Wiremold are to remain.

8) Please reference 27 05 00 2.05B 1 & 2. Use of innerduct and fabric innerduct. s this a requirement given that the required fiber cabling is armored?
   (a) No innerduct is required.

9) Reference T-700 MDF General Note #10. Provide 6" slim line cords. Question: Are these required to be Panduit? Are patch cords required at the WAO? Length??
   (a) Yes, patch cords are required to be Panduit. Contractor is not responsible for patch cords at the Work Area Outlet.

10) Please reference27 00 00 2.02.B & Appendix A 27 10 00. Discrepancy on whether Plenum rated cable is required in all spaces. Question: Is plenum-rated cable required in non-plenum spaces?
    (a) Plenum cable is required throughout due to smaller diameter.

11) Please reference 00 70 00 1.16. Will Sanitary Facilities be required for this project?
    (a) Yes. Contractor is to provide their own sanitary facilities and cannot rely on the site for use.

12) Please reference 00 70 00 13.1.5 & 6. Is SMA and Builders Risk Insurance a requirement for this project?
    (a) SMA insurance is not a requirement and will be waived.

13) Are there DVBE requirements for this project?
    (a) There is DVBE Participation goal, but no requirement. Review of Volume 1 Bid documentation.

14) Our cabling company for that area attended the job walk last week, and they are local. Does that count for this requirement?
    (a) The requirement is waived for the purposes of Section 27 21 00 and 28 20 00. The requirement stands for the purposes of 27 51 23 (Educational Intercom). The Bogen-authorized installer/subcontractor must meet the distance/response time requirement.

15) There is mention of the interior conduits to be factory finished (blue & green), is that correct?
    (a) The interior electrical conduits should be painted to match existing wall colors. This specification will be updated in the conformed set.

16) Did the bid date change?
    (a) The bid date did not change. Bids are due 01/21/2025 at 10am, as noted in the bid documents.

END OF SECTION

ADDENDUM # 01

Project: Mt Diablo Unified School District
Loma Vista Adult Center
Technology Infrastructure Upgrade
19six #: 24103.01

Bid #: 1948
Date: January 15, 2025

To all bidders submitting proposals for the above captioned project. This Addendum is hereby included in the Contract Documents to the same extent as though it were originally included therein. The following items modify, add to, delete from, or explain the drawings and/or specifications. The contents of this Addendum shall take precedence over the original specifications and plans.

Note: All drawing revisions have been clouded with delta **A** which indicates changes captured in Addendum #01

BID DEADLINE:

The bid time shall not change.

Bid due date: 10:00 AM Tuesday, January 28, 2025

at: Mt Diablo Unified School District
Purchasing & Warehouse Department
2326 Bisso Lane
Concord, CA 94520

CHANGES TO SPECIFICATIONS

Item #1: **Update to the Table of Contents** The Table of Contents has been updated to include Divisions 7 and 26, along with new specifications in Division 1 as detailed in Item #3

Item #2: **Update the 09 29 00 specification title to the table of contents** specifications title has been updated to read "Gypsum Board and Sheathing substrates"

Item #3: **New Specifications added**
01 60 00 - PRODUCT REQUIREMENTS
01 74 19 CONSTRUCTION WASTE MANAGEMENT
07 56 10 – ROOF REPAIR
26 05 00 - GENERAL REQUIREMENTS FOR ELECTRICAL SYSTEMS
26 05 05 - SELECTIVE DEMOLITION FOR ELECTRICAL
26 05 26 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS
26 05 33.13 - CONDUIT FOR ELECTRICAL SYSTEMS
26 05 33.16 - BOXES FOR ELECTRICAL SYSTEMS

26 05 53 - IDENTIFICATION FOR ELECTRICAL SYSTEMS
26 05 83 - WIRING CONNECTIONS

CHANGES TO DRAWINGS

None

ATTACHMENTS:

SPECIFICATIONS
00 00 03 - TABLE OF CONTENTS
01 60 00 - PRODUCT REQUIREMENTS
01 74 19 CONSTRUCTION WASTE MANAGEMENT
07 56 10 – ROOF REPAIR
26 05 00 - GENERAL REQUIREMENTS FOR ELECTRICAL SYSTEMS
26 05 05 - SELECTIVE DEMOLITION FOR ELECTRICAL
26 05 26 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS
26 05 33.13 - CONDUIT FOR ELECTRICAL SYSTEMS
26 05 33.16 - BOXES FOR ELECTRICAL SYSTEMS
26 05 53 - IDENTIFICATION FOR ELECTRICAL SYSTEMS
26 05 83 - WIRING CONNECTIONS

Presley Obenshain – Project Manager

TABLE OF CONTENTS

END OF TABLE OF CONTENTS

SECTION 01 60 00 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and product substitutions.

B. Related Sections include the following:
   1. Division 1 Section "References" for applicable industry standards for products specified.
   2. Division 1 Section "Closeout Procedures" for submitting warranties for Contract closeout.
   3. Other Sections for specific requirements for warranties on products and installations specified to be warranted.

1.3 DEFINITIONS

A. Products: Items purchased for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
   1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
   2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.

B. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor. Proposed products by manufacturers not listed in Manufacturers list.

C. Basis-of-Design: Where a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating “or equal” products of other named manufacturers.

D. District Standard: Where a specific manufacturer's product is named and accompanied by the words "District Standard," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics pre-selected by the District.
   1. District seeks to match products currently in use on other campuses; No substitution allowed.

1.4 SUBMITTALS

A. Product List: Submit a list, in tabular from, showing specified products. Include generic names of products required. Include manufacturer's name and proprietary product names for each product.
   1. Coordinate product list with Contractor's Construction Schedule and the Submittals Schedule.
   2. Form: Tabulate information for each product under the following column headings:
      a. Specification Section number and title.
      b. Generic name used in the Contract Documents.
      c. Proprietary name, model number, and similar designations.
      d. Manufacturer's name and address.
      e. Supplier's name and address.
      f. Installer's name and address.
      g. Projected delivery date or time span of delivery period.
      h. Identification of items that require early submittal approval for scheduled delivery date.
   3. Completed List: Submit 3 copies of completed product list within days specified in General Conditions. Include a written explanation for omissions of data and for variations from Contract requirements.
   4. Architect's Action: Architect will respond in writing to Contractor within 21 days of receipt of completed product list. Architect's response will include a list of unacceptable product selections and a brief explanation of reasons for this action. Architect's response, or lack of response, does not constitute a waiver of requirement to comply with the Contract Documents.

B. Substitution Requests: (REFER TO SECTION 2.2 FOR ADDITIONAL SUBSTITUTION REQUIREMENTS) Submit 4 copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Substitution Request Form: Use form provided at end of Section.
2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
   a. Statement indicating why specified material or product cannot be provided.
   b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
   c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, environmental, and specific features and requirements indicated.
   d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
   e. Samples, where applicable or requested.
   f. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
   g. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
   h. Research/evaluation reports evidencing compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.
   i. Detailed comparison of Contractor's Construction Schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating lack of availability or delays in delivery.
   j. Cost information, including a proposal of change, if any, in the Contract Sum.
   k. Contractor's certification that proposed substitution complies with requirements in the Contract Documents and is appropriate for applications indicated.
   l. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
3. Architect's Action: Architect will notify Contractor of acceptance or rejection of proposed substitution within 21 days of receipt of request.
   a. Form of Acceptance: Change Order.
   b. Use product specified if Architect cannot make a decision on use of a proposed substitution within time allocated.

C. The cost for any additional design or engineering required to gain DSA approval of a substitution shall be borne solely by the contractor. Any delay impacts resulting from substitutions shall be borne solely by the contractor.

D. Named Product and Basis-of-Design Product Specification Submittal: Comply with requirements in Division 1 Section "Submittal Procedures." Show compliance with requirements.

E. District Standard Products Specification Submittal: Comply with requirements in Division 1 Section "Submittal Procedures." Show compliance with requirements.

1.5 QUALITY ASSURANCE

A. Reference Standards: The 2022 Code of Regulations CCR, CFC, CMC, CPC, CEC Govern
    1. Title 19 CCR, Public Safety, State Fire Marshall Regulations
    2. Title 24 CCR, Part 1 - 2022 Building Standards Administrative Code
    3. Title 24 CCR, Part 2 - 2022 California Building Code, VOL. 1&2 (CBC) (2021 IBC, as Amended by CA)
    4. Title 24 CCR, Part 3 - 2022 California Electrical Code (CEC) (2020 NEC, as Amended by CA)
    5. Title 24 CCR, Part 5 - 2022 California Plumbing Code (CPC) (2021 IAPMO UPC, as Amended by CA)
    6. Title 24 CCR, Part 6 - 2022 California Energy Code
    7. Title 24 CCR, Part 9 - 2022 California Fire Code (CFC) (2021 IFC, as Amended by CA
    8. Title 24 CCR, Part 11 - 2022 California Green Building Standards Code (Calgreen Code)
    9. Title 24 CCR, Part 12 - 2022 California Reference Standards (Partial List)
    10. NFPA 101- Life Safety Code. 2021 Edition
    11. 2022 ADA Standards for Accessible Design
    12. Americans with Disabilities Act (ADA), Title II or Title III.

B. Changes to the approved drawings and specifications shall be made by an addendum or a Construction Change Document.

C. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, product selected shall be compatible with products previously selected, even if previously selected products were also options.
    1. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.

B. Delivery and Handling:
   1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
   2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
   3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
   4. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.

C. Storage:
   1. Store products to allow for inspection and measurement of quantity or counting of units.
   2. Store materials in a manner that will not endanger Project structure.
   3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
   4. Store cementitious products and materials on elevated platforms.
   5. Store foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
   6. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
   7. Protect stored products from damage and liquids from freezing.
   8. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.7 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
   1. Manufacturer's Warranty: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.

2. Special Warranty: Written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution. Submit a draft for approval before final execution.
1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included with the Specifications, prepare a written document using appropriate form properly executed.
3. Refer to other sections for specific content requirements and particular requirements for submitting special warranties.

C. Warranty Period: Warranty period specified in each sections are minimum requirements. Do not modify manufacturer’s standard warranty period if the manufacturer’s warranty has longer warranty period.

D. Submittal Time: Comply with requirements in Division 1 Section "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, that are new at time of installation.
1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Where products are accompanied by the term "match sample," sample to be matched is Architect's.
6. Descriptive, performance, and reference standard requirements in the Specifications establish "salient characteristics" of products.

B. Product Selection Procedures:

1. Product: Where Specifications name a single product and manufacturer, provide the named product that complies with requirements.
2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements.
3. Products: Where Specifications include a list of names of both products and manufacturers, provide one of the products listed that complies with requirements.
4. Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements.
5. Basis-of-Design Product: Where Specifications name a product and include a list of manufacturers, provide the specified product or an equal product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with “or equal”.
6. Or Equal: Where products are specified by name and accompanied by the term "or equal" or "or approved equal" or "or approved," comply with provisions in Part 2 "Product Substitutions" Article to obtain approval by Architect for use of an unnamed product.
7. Visual Matching Specification: Where Specifications require matching an established Sample, select a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
    a. If no product available within specified category matches and complies with other specified requirements, comply with provisions in Part 2 "Product Substitutions" Article for proposal of product.
8. Visual Selection Specification: Where Specifications include the phrase "as selected from manufacturer's colors, patterns, textures" or a similar phrase, select a product that complies with other specified requirements.
    a. Standard Range: Where Specifications include the phrase "standard range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, density, or texture from manufacturer's product line that does not include custom or premium items.
    b. Full Range: Where Specifications include the phrase "full range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, density, or texture from manufacturer's product line that includes standard, custom, and premium items.

2.2 PRODUCT SUBSTITUTIONS

A. Timing: Architect will consider requests for substitution if received within 35 days after the Notice to Proceed. Requests received after that time may be considered or rejected at discretion of Architect.

B. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
   1. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
   2. Requested substitution does not require extensive revisions to the Contract Documents.
   3. Requested substitution is consistent with the Contract Documents and will produce indicated results.
   4. Substitution request is fully documented and properly submitted.
   5. Requested substitution will not adversely affect Contractor's Construction Schedule.
   6. Requested substitution has received necessary approvals of authorities having jurisdiction and has paid any fees.
   7. Requested substitution is compatible with other portions of the Work.
   8. Requested substitution has been coordinated with other portions of the Work.
   9. Requested substitution provides specified warranty.
   10. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
   11. Furnish samples upon requested by Architect.
   12. Attached Request for Substitution Form shall used for substitution requests.

C. Substitutions for products or systems involving structural, fire/life safety and access compliance will require additional review and can be subject to DSA approval. This will add time required to review those substitutions requiring DSA approval. Contractor is solely responsible for all documentation and time required to obtain DSA approval.
   1. The use of a product other than specified or noted on the Drawings will require the Contractor to get Engineer and Architect.
   2. The Contractor shall be responsible to provide any information, calculations or drawings to show compliance with the drawings and provide all documentation to the Architect and/or Engineer of record.

3. Any changes or "substitutions" that impact or relate to DSA requirements for structural, ADA or fire and life safety MUST be approved by DSA prior to proceeding with the work.
4. The Contractor shall also be responsible for all costs to the DSA, Architect or Architect consultants for review, co-ordination, and approval by the DSA.
    a. All costs for submittal to DSA and Architect/ design team expenses shall be back charged to the Contractor.

PART 3 - EXECUTION

3.1 FORMS

A. Electronic versions of attached forms will be provided upon request.
    1. Product List Form.
    2. Similar Installation List Form.
    3. Substitution Request Form.

END OF SECTION 01 60 00

SECTION 01 74 19 - CONSTRUCTION WASTE MANAGEMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for the following:

1. Disposing of nonhazardous construction waste.

B. Related Sections include the following:

1. Division 1 Section "Temporary Facilities and Controls" for environmental-protection measures during construction.

1.3 DEFINITIONS

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

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

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

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

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

F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.4 PERFORMANCE REQUIREMENTS

A. General: Develop waste management plan that results in end-of-Project rates for salvage/recycling of 75 percent by weight of total waste generated by the Work.

1.5 SUBMITTALS

A. Waste Management Plan: Submit 3 copies of plan within 30 days of date established for the Notice to Proceed.

B. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit three copies of report. Include the following information:
   1. Material category.
   2. Generation point of waste.
   3. Total quantity of waste in tons.
   4. Quantity of waste salvaged, both estimated and actual in tons.
   5. Quantity of waste recycled, both estimated and actual in tons.
   6. Total quantity of waste recovered (salvaged plus recycled) in tons.
   7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.

C. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

D. Qualification Data: For Waste Management Coordinator.

E. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

1.6 QUALITY ASSURANCE

A. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.

B. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.

C. Waste Management Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination." Review methods and procedures related to waste management including, but not limited to, the following:
   1. Review and discuss waste management plan including responsibilities of Waste Management Coordinator.
   2. Review requirements for documenting quantities of each type of waste and its disposition.

3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
5. Review waste management requirements for each trade.

1.7 WASTE MANAGEMENT PLAN

A. General: Develop plan consisting of waste identification, waste reduction work plan, and cost/revenue analysis. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.

B. Waste Identification: Indicate anticipated types and quantities of construction waste generated by the Work. Include estimated quantities and assumptions for estimates.

C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.
1. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
2. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
3. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location on Project site where materials separation will be located.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

A. General: Implement waste management plan as approved by Architect. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
1. Comply with Division 1 Section "Temporary Facilities and Controls" for operation, termination, and removal requirements.

B. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan. Coordinator shall be present at Project site full time for duration of Project.

C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.
   1. Distribute waste management plan to everyone concerned within three days of submittal return.
   2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.

D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
   1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
   2. Comply with Division 1 Section "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

3.2 RECYCLING CONSTRUCTION WASTE, GENERAL

A. General: Recycle paper and beverage containers used by on-site workers.

B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall be shared equally by Owner and Contractor.

C. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical.
   1. Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
      a. Inspect containers and bins for contamination and remove contaminated materials if found.
   2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
   3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
   4. Store components off the ground and protect from the weather.
   5. Remove recyclable waste off Owner's property and transport to recycling receiver or processor.

3.3 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
    1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
    2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials.

C. Disposal: Transport waste materials off Owner's property and legally dispose of them.

END OF SECTION 01 74 19

SECTION 07 56 10

ROOFING REPAIR

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Provide all labor, equipment, and materials to maintain and protect the existing roof system.

1.02 RELATED SECTIONS

A. Section 07 62 00- Sheet Metal Flashing and Trim: Sheet metal flashing and trim.

1.03 SYSTEM DESCRIPTION

A. Roofing work including but not limited to:
   1. Flashing installation at new penetrations.
   2. Repair of damaged or deteriorated flashing.
   3. Install fill insulation where needed, base sheet and modified cap sheet per detail.
   4. All flashings to consist of one ply of base sheet set in mastic covered by an additional layer of modified bitumen membrane.
   5. Roof coating:
      a. Acrylic/urethane hybrid in field of roof.
   6. Vent coating.

1.04 PERFORMANCE REQUIREMENTS

A. Make roof weathertight and watertight. All drainage to flow off roof, do not permit standing water.

1.05 SUBMITTALS

A. See Section 01 33 00 - Submittals, for submittal procedures.
B. Product Data: Provide manufacturer's data sheets documenting conformance with specified requirements.
C. Manufacturer's Field Reports: Indicate deviations or deficiencies observed during site visits, record method of resolution.
D. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than five years of documented experience.
   1. Manufacturer will inspect completed work.
B. Installer Qualifications: Company specializing in performing the work of this section and approved by manufacturer.
   1. Installer's Field Supervision: Require Installer to maintain a full-time Supervisor/Foreman on job site during all phases of bituminous sheet roofing work and at any time roofing work is in progress, proper supervision of workmen shall be maintained. A copy of the specification shall be in the possession of the Supervisor/Foremen and on the roof at all times.
C. Respond immediately to correction of roof leakage during construction. If the contractor does not respond within 24 hours, the Owner has the right to hire a qualified contractor and backcharge the original contractor.

1.07 PRE-INSTALLATION MEETING

A. Convene two weeks before starting work of this section. Meet at Project site with Installer, installer of each component of associated work, installers of deck or substrate construction to receive roofing work, installers of rooftop units and other work in the around roofing that must precede or follow roofing work (including mechanical work if any), Architect/Owner, roofing system manufacturer's representative, and other representatives directly concerned with performance of the Work, including (where applicable) Owner's insurers, test agencies, and governing authorities. Objectives to include:

B. Review preparation and installation procedures and coordinating and scheduling required with related work.
   1. Review methods and procedures related to roofing work.
   2. Review structural loading limitations of deck.
   3. Review roofing systems requirements (drawings, specifications, and other contract documents).
   4. Review required submittals, both completed and yet to be completed.
   5. Review and finalize construction schedule related to roofing work and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
   6. Review required inspection, testing, certifying, and material usage accounting procedures.
   7. Review weather and forecasted weather conditions and procedures for coping with unfavorable conditions, including provision of temporary roofing over occupied spaces.
   8. Record discussion of conference, including decisions and agreements (or disagreements) reached, and furnish copy of record to each party attending. If substantial disagreements exist at conclusion of conference, determine how disagreements will be resolved and set date for reconvening conference.
   9. Review notification procedures for weather or non-working days.

1.08 DELIVERY, STORAGE, AND PROTECTION

A. Deliver products to site with seals and labels intact, in manufacturer's original containers, dry and undamaged.

B. Store and handle roofing materials in a dry, well-ventilated, weather-tight place to ensure no possibility of significant moisture exposure. Store rolls of felt and other sheet materials on pallets or other raised surface. Stand all roll materials on end. Cover roll goods with a canvas tarpaulin or other breathable material (not polyethylene).

C. Do not leave unused rolled goods on the roof overnight or when roofing work is not in progress unless protected from weather and other moisture sources.

D. Contractor shall secure all material and equipment on the job site. If material or equipment is stored on the roof, the contractor shall ensure that the integrity of the deck is not compromised at any time. Damage to the deck caused by the contractor will be the sole responsibility of the contractor and will be repaired or replaced at his expense.

1.09 PROJECT CONDITIONS

A. Coordinate roof repair installation with size, location and installation of roof mounted work.

1.10 ENVIRONMENTAL REQUIREMENTS

A. Weather Condition Limitations: Do not apply materials during inclement weather or when a 40% chance of precipitation is expected.

B. Materials shall be stored at room temperature until immediately prior to application when the ambient temperature is 40°F or below. Discontinue the application if the material can not be stored at a temperature which permits even distribution during application.

C. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed during same day.

1.11 WARRANTY

A. Correct defective Work within two year period after Date of Substantial Completion.

B. Provide two year contractor warranty for roof repair.

C. Provide letter from manufacturer with original warranty number and approval of repair work.

PART 2 PRODUCTS

2.01 MATERIALS as Manufactured by The Garland Company 925-784-6701.

A. Base Ply and Base Flashing Ply: Flexbase 80.
B. Field and flashing Cap sheet: Stressply EUV FR Mineral, SBS (Styrene-Butadiene-Styrene) mineral surfaced rubber modified roofing membrane reinforced with a dual fiberglass scrim and polyester mat, ASTM D-6162 Type III Grade G.
C. Asphalt Primer: Garla-Prime VOC - V.O.C. compliant, ASTM D-41.
D. Flashing and Field adhesive: Green-Lock Plus Flashing Adhesive
E. Reinforcing Fabric: Gar-Mesh Fiberglass Mesh
F. Roof coatings
    1. Roof field and flashing: Pyramic Plus LO acrylic.
G. Insulation: ½" Densdeck Prime.
H. Insulation fasteners: per roof system manufacturer.
I. Soft Metal Flashings: Green-Weld PVB
    1. Adhesive: Green-Lock Structural Adhesive

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrate surfaces to receive roofing system and associated work and conditions under which roofing will be installed. Do not proceed with roofing until unsatisfactory conditions have been corrected in a manner acceptable to Roof System Manufacturer and Installer.

3.02 INSTALLATION

A. Powerwash roof repair area.
B. In repair area, use a torch to burn off existing coating system. Remove coating a minimum of 8" from edge of roof cut to ensure ability to adhere new membrane to existing roof system.
C. Prepare all penetrations to be flashed and where shown on the drawings, with asphalt primer at the rate of one hundred (100) square feet per gallon. Allow primer to dry tack free.
D. Where roofing is removed, mechanically attach coverboard to deck to match height of existing finished roof surface.
E. All plies will be adhered with the following:
    1. With mastic at a rate of 4-6 gallons per 100 square feet. The base flashing and the modified membrane will be used as the flashing and nailed off 8" O.C. at all vertical surfaces.
F. Seal perimeter of roof with Green-Lock Flashing. Min. ½" deep at edge.
G. The entire sheet of the base flashing and the flashing membrane must be solidly adhered to the substrate.
H. Seal all vertical laps of flashing membrane with a three-course application of Green-Lock Flashing and fiberglass mesh. Broadcast minerals into 3 course application.
I. Seal junction of flashing membrane and roof with a three-course application of Green-Lock Flashing and mesh. Broadcast minerals into 3 course application.
J. Solar and pipe penetrations and stanchions shall be flashed with Green-Weld PVB per manufacturers installation instructions.
K. Coating work:
    1. Apply Pyramic LO at a rate of 1.5 gal per sq. Apply two coats.

2. Coat all flashing all flashing within that area indicated on the roof plan with Pyramic LO.

3.03 INTERFACE WITH OTHER WORK

A. Coordinate with roof accessories, miscellaneous sheet metal accessory items, including piping vents and other devices to be coordinated with the roofing work as specified in other sections to avoid conflict or omission in waterproofing systems and to provide watertight installation.

3.04 FIELD QUALITY CONTROL

A. At completion of roofing installation and associated work, meet with Installer, installer of associated work, Owner, roofing system manufacturer's representative, and other representatives directly concerned with performance of roofing system.

B. Walk roof surface areas of the building, inspect perimeter building edges as well as flashing of roof penetrations, walls, curbs and other equipment. List all items requiring correction or completion and furnish copy of list to each parting attending.

C. The Roofing System Manufacturer reserves the right to request a thermographic scan of the roof during final inspection to determine if any damp or wet materials have been installed. The thermographic scan shall be provided by the Roofing Contractor at a negotiated price.

D. If core cuts verify the presence of damp or wet materials, the Roofing Contractor shall be required to replace the damaged areas at his own expense.

E. Repair or replace (as required) deteriorated or defective work found at time above inspection to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

F. The Contractor is to notify the Owner upon completion of corrections.

G. Following the final inspection, acceptance will be made in writing by the material manufacturer.

3.05 CLEANING and PROTECTION

A. Clean roof and surrounding surfaces.

B. Protect installed work from subsequent construction operations.

C. Do not permit traffic over unprotected roof surface.

END OF SECTION

SECTION 26 05 00
GENERAL REQUIREMENTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 DESCRIPTION OF WORK:

A. The work of this Section consists of providing all required labor, supervision, materials and equipment (except equipment furnished by the Owner to be installed by the Contractor) to satisfactorily complete the work shown on the drawings and/or specified in all Sections of Division 26 and all other work and miscellaneous items, not specifically mentioned, but reasonably inferred for a complete and fully operating facility. The work shall include but not be limited to the following:
   1. Furnish and install all required in-place equipment, conduits, conductors, cables and any miscellaneous materials for the satisfactory interconnection and operation of all associated electrical systems.

1.2 RELATED WORK:

A. This Section provides the basic Electrical Requirements which supplement the General Requirements of Division 1 and apply to all Sections of Division 26.

1.3 STANDARDS AND CODES:

A. All work and material shall be in compliance with and according to the requirements of the latest revision of the following standards and codes:
   1. California Electrical Code (CEC)
   2. National Fire Protection Association (NFPA):
      a. 70 National Electrical Code (NEC)
   3. American National Standards Institute (ANSI) Publications:
      a. C2-02 National Electrical Safety Code
   4. Code of Federal Regulations (CFR):
      a. 29 CFR 1910.147 Control of Hazardous Energy (Lock Out/Tag Out)
   5. Electronics Industries Association / Telecommunications Industries Association (EIA / TIA)
   6. Institute of Electrical and Electronics Engineers (IEEE)
   7. National Electrical Testing Association (NETA):
      a. Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems, Standard ATS
   8. National Electrical Manufacturers Association (NEMA)
   9. Occupational Safety and Health Act (OSHA) Standards
   10. State of California Public Utilities Commission:
      a. General Order 128 Rules for Construction of Underground Electric Supply and Communication Systems
   11. Variances: In instances where two or more codes are at variance, the most restrictive requirement shall apply.

12. Underwriter Laboratories (UL) listing is required for all equipment and materials where such listing is offered by the Underwriters Laboratories. Safety labeling and listing by other organizations, such as ETL Testing Laboratories, may be substituted for UL labeling and listing if acceptable to the Owner. Provide service entrance labels for all equipment required by the NEC to have such labels.

1.4 SUBMITTALS:

A. As specified in Division 1. Submit to the Engineer shop drawings, manufacturer's data and certificates for equipment, materials and finish, and pertinent details for each system specified. Obtain approval before procurement, fabrication, or delivery of the items to the job site. Partial submittals are not acceptable and will be returned without review.
B. Submittals are required for all items, regardless of whether they are furnished as specified or are substituted.
C. Submittals shall be provided prior to the purchasing and installation of the item(s) being submitted. Any work done prior to the final approval of the submittal shall be done at risk and any modifications, changes, or re-work that may be required resulting from the final submittal review shall be provided by the Contractor at no additional cost to the project.
D. Information to be submitted includes manufacturer's name, trade name, equipment model number, nameplate data, equipment drawings including: size, layout dimensions and capacity, manufacturer's descriptive literature of cataloged products, diagrams, fault and coordination study, seismic calculations, test data, and performance and characteristic curves as applicable. Furnish project specification and paragraph reference, applicable Federal, Industry and Technical Society Publication References, and years of satisfactory service of each item required to establish contract compliance. Photographs of existing installations and data submitted in lieu of catalog data are not acceptable and will be returned without approval.
E. If submittal information includes multiple products, items being submitted for approval shall be clearly identified and Items not to be used on the project shall be clearly marked out. Submittals consisting of manufacturer's catalogs without clearly marking out items not being used will be returned as not reviewed.
F. Organize submittals for equipment and items related to each specification section together as a package.
G. Submit submittal packages in digital PDF format.
    1. Certificates of Conformance: Submit manufacturer's certifications as required on products, materials, finish, and equipment indicated in the technical sections. Certifications shall be documents prepared specifically for this contract. Preprinted certifications and copies of previously submitted documents will not be acceptable. The manufacturer's certifications shall name the appropriate products, equipment, or materials and the publication specified as controlling the

quality of that item. Certification shall not contain statements that imply the item does not meet requirements specified, such as “as good as”, “achieve the same end use and results as materials formulated in accordance with the referenced publications;” or “equal or exceed the service and performance of the specified material.” Certifications shall state that the item conforms to the requirements specified. Certificates shall be printed on the manufacturer’s letterhead and shall be signed by the manufacturer’s official, authorized to sign certificates of conformance.

H. Substitutions:
1. The equipment included in the Contract Documents is used to establish standards of quality, utility, size, and appearance. Equipment which in the opinion of the Engineer is equal in quality, utility, size, and appearance will be approved as substitutions to that specified.
   a. Products that are specified by manufacturer, trade name or catalog number establish a standard of quality and do not prohibit the use of equal products of other manufacturers provided they are approved by the Engineer prior to bidding.
2. Substitutions will be accepted for review where there is a reasonable reason for the substitution. Reasonable reasons include:
   a. Cost savings to the Owner. Include deductive change order with submittal.
   b. A product with features providing additional benefits to the end user.
   c. Improved finished environment, lay out of the final installation, or space savings over the specified equipment.
   d. Delivery considerations.
   e. Owner’s specific requests.
3. Where items are noted as ”or equal”, a product of equal design, construction and performance will be considered.
4. Any item proposed as a substitute shall be accompanied by the following:
   a. Drawings and/or data giving sizes, capacities, all pertinent test data, catalog cut sheets, product information, and all other necessary information required to substantiate that the product is equal or exceeds that specified.
   b. A summary sheet noting each performance characteristic noted in the specification section or elsewhere in the contract documents of the specified product and the corresponding performance characteristics of the proposed substitution. The summary sheet shall contain the following information:
      1) Reason for Substitution Request
      2) Pertinent Performance Characteristics
      3) Specified Product Values
      4) Substituted Product Values
   c. Any substitution request that does not include the above information shall be rejected.

d. Refer to the end of this specification section for an example form to be used for substituted products. A Microsoft Word version of the form can be provided to the Contractor for their use upon request.

5. Substitutions shall be equal, in the opinion of the Engineer, to the specified equipment. The burden of proof of such shall rest with the Contractor. When the Engineer in writing accepts a substitution, it is with the understanding that the Contractor guaranteed the substituted equipment to be equal to the one specified and dimensioned to fit within the construction. Approved substitutions shall not relieve the Contractor of responsibilities for the proper execution of the work, or from any provisions of the Plans or Specifications.
6. Contractor shall be responsible for coordination of the substituted products with other trades. Provide all additional connectivity, equipment, increased wire/conduit size, installation hardware, testing, and other miscellaneous appurtenances as required for a complete and fully functional installation.
7. Only one substitution will be considered for each product specified.
8. Alternate manufacturers must be submitted for approval 10 days prior to bid date unless noted otherwise in Division 1.
9. The Contractor shall be responsible for all expenses in connection with the substitution materials, process, and equipment, including the effect of his/her substitution on him/her, his/her sub-Contractor’s or other Contractor’s work. No substitution shall be permitted without written authorization of the Engineer. Any assumptions on the acceptability of a proposed substitution prior to acceptance by the Engineer are at the sole risk of the Contractor.

I. Change Orders:

1. Where a change to the contract documents would result in a credit due to the Owner or a value add change to the project, provide a detailed change order request for the Engineer to review.
2. It shall be understood that the Engineer’s review of costs associated with the change order shall not constitute approval of the change order or their associated costs. The Engineer’s review shall be intended to assist the Owner in evaluating the costs associated with the change only. Final approval or rejection of the change order shall be at the discretion of the Owner.
3. Change order requests shall include the following information:
   a. Description of the change
   b. Reference to the document or written direction to make the change:
      1) In the case of design-team directed changes, reference the drawing/sketch number or RFI number.
      2) In the case of Owner-directed changes, reference the email, memo, or other written direction from the Owner and provide a copy of the direction.
   c. Detailed cost breakdown for the change:

1) Line item for each material noting:
   (a) Material used (e.g. ¾" EMT)
   (b) Total quantity (e.g. 200lf)
   (c) Unit cost (e.g. $2/lf)
   (d) Total materials cost (e.g. $400)
   (e) Unit labor hours (e.g 6hrs/100lf)
   (f) Total labor hours (e.g. 12hrs)
   (g) Hourly rate (e.g. $90/hr)
   (h) Total labor cost (e.g. $1,080
2) Total labor hours for each position (e.g. Journeyman vs. Superintendent)
3) Total materials cost
4) Overhead
5) Profit
6) Total change order value (positive for value added changes, negative for credits)

J. Closeout Submittals:
1. As-built drawings: Submit As-Built Record documents as in accordance with section 3.05 below.
2. Cost analysis: Submit final cost information including original bid and any change orders broken down by system, material and labor costs (as applicable):
   a. Power distribution
   b. Lighting and lighting controls
   c. Low Voltage systems
3. Operation and Maintenance Manuals: Furnish O & M Manuals for equipment where manuals are specified in the equipment specifications or are specified in Division 1. Electrical O & M Manuals shall be provided in a single transmittal and shall include as a minimum:
   a. Copies of equipment supplied on the project.
   b. Instruction manuals including operation instructions and maintenance requirements/recommendations.
   c. List of suppliers for all equipment with addresses and telephone numbers.
   d. List of service support for all equipment with addresses and telephone numbers.
   e. Copies of all test reports required in Division 26 specification sections.
   f. Spare Parts: For each piece of equipment, submit a list of recommended spare parts. Include part numbers and the name, address, and telephone number of the supplier.
   g. Other closeout documentation and test results as required under other sections of the specifications.
   h. Warranty for all work, equipment, and systems, including Contractor's general warranty.

i. All warranties begin as per the Contract, Division 1 or final acceptance of the Work by the Owner, Architect, Engineer, and Authority Having Jurisdiction, which ever is later.
   1) Lamps, drivers, and ballasts are to be covered as per specification 26 51 00.
   2) Manufacturer's Warrantees and Guarantees that are longer than the base contract/specified amount are to be provided with the manuals.
   3) The Contractor is responsible for all Warranty and Guarantee work whether or not the Manufacturer also Warrantees and Guarantees the product.

1.5 CONTRACT DOCUMENTS:

A. Review the Drawings and Specification Divisions of other trades and perform the electrical work that will be required for the installations.
   1. Should there be a need to deviate from the Electrical Drawings and Specifications, submit written details and reasons for all changes to the Engineer for favorable review.
   2. All drawings and divisions of these specifications shall be considered as whole. This Contractor shall report any apparent discrepancies prior to submitting bids.
   3. Should there be a conflict or discrepancy between the drawings and specifications, or between different drawings sheets, or between different specification sections, the most expensive option shall be required, at the discretion of the Engineer.

B. Drawings:
   1. The Drawings shall govern the general layout of the completed construction:
      a. Locations of equipment, inserts, anchors, panels, pullboxes, manholes, conduits, stub-ups, fittings, power and convenience outlets, lighting fixtures and ground connections are approximate unless dimensioned; verify locations with the Engineer prior to installation. Field verify scaled dimensions on Drawings.
      b. The general arrangement and location of existing conduits, piping, apparatus, etc., is shown as existing on drawings or specified. The drawings and specifications are for the assistance and guidance of the Contractor, exact locations, distances and elevations are governed by actual field conditions. Extreme accuracy of data given herein and on the drawings is not guaranteed. Minor changes may be necessary to accommodate work. The Contractor is responsible for verifying existing conditions. Should it be necessary to deviate from the design due to interference with existing conditions or work in progress, claims for additional compensation shall be limited to those for work required by unforeseen conditions as determined by the Engineer.

1.6 COORDINATION:

A. Coordinate the electrical work with the other trades, code authorities, utilities and the Engineer:
   1. Failure to accomplish this coordination is not a basis for additional cost reimbursement to the Contractor.
   2. Coordinate does not mean to only send a Request For Information. Coordinate implies that the Contractor is to take the lead in bringing all of the necessary organizations together to coordinate the work and to provide for the associated costs.

B. Where connections must be made to existing installations, properly schedule all the required work, including the power shutdown periods. Schedule and carry out shutdowns so as to cause the least disruption to operation of the Owner’s facilities:
   1. Include costs for work during non-normal working hours and temporary facilities as may be required.
   2. Include costs as necessary for sub-Contractors as necessary to accomplish the specified work.

C. When two trades join together in an area, make certain that no electrical work is omitted. Failure to accomplish this coordination is not a basis for additional cost reimbursement to the Contractor.

D. Operations:
   1. Perform all work in compliance with Division 1:
      a. Keep the number and duration of power shutdown periods to a minimum.
      b. All shutdowns which would interfere with the operations of Owner’s equipment or facilities shall be coordinated with the Owner a minimum of 15 days in advance.
         1) Where Owner’s equipment or facilities must remain operational during the shutdown, provide sufficient means to temporarily backup the interrupted services for the duration of the interruption.
      c. Show all proposed shutdowns and their expected duration on the construction schedule.
         1) If the construction schedule is created and maintained by others, make sure that the associated information is incorporated.
         2) Failure by the Contractor to properly schedule and plan for such activities is not a basis for additional compensation.
      d. Carry out shutdown only after the Engineer has favorably reviewed the schedule. Submit power/communications interruption schedule 15 days prior to date of interruption. Failure to provide schedule with adequate review time may result in rescheduling of the work at the Contractor’s expense.

E. Construction Power:
   1. See Division 1 Temporary Facilities and Controls.

F. Storage:
   1. Provide adequate storage for all equipment and materials which will become part of the completed facility so that it is protected from sun, weather, condensation, dust, water, or construction operations.

G. Damaged Products:
   1. Notify the Engineer in writing in the event that any equipment or material is damaged. Obtain approval from the Engineer and Manufacturer before making repairs to damaged products.

H. Order material in such a timely manner and after approval of the same so as to insure that the approved material is available to be installed on site in a timely manner. Additional costs or substitutions necessitated because the Contractor failed to order material in a timely manner are not reimbursable. Costs associated with processing of paperwork by the Owner and design consultants resultant of such failures to coordinate the work by the Contractor shall have such costs reimbursed by the Contractor.

1.7 LOCATIONS:

A. General: Use equipment, materials and wiring methods suitable for the types of locations in which they are located.
   1. Dry Locations:
      a. All those indoor areas which do not fall within the definition below for Wet Locations and which are not otherwise designated on the Drawings.
   2. Wet Locations:
      a. All locations exposed to the weather or contact with water (such as kitchen areas subject to directional water spray as a means of cleaning surfaces), whether under a roof or not, unless otherwise designated on the Drawings.

1.8 SAFETY AND INDEMNITY:

A. Lock out Requirements:
   1. Provide disconnecting means capable of being locked out for machines and other equipment to prevent unexpected startup or release of stored energy in accordance with 29 CFR 1910.147

B. The Contractor is solely and completely responsible for conditions of the job site including safety of all persons and properly during performance of the work. This requirement will apply continually and not be limited to normal working hours.
   1. No act, service, drawing review or construction review by the Owner, the Engineer or their Consultants is intended to include reviews of the adequacy of the Contractors safety measures in or near the construction site.
   2. The Contractor performing work under this Division of the Specifications shall hold harmless, indemnify, and defend the Owner, the Engineer, their consultants, and each of their officers, agents and employees from any and all liability claims, losses, or damage arising out of or alleged to arise from bodily injury, sickness, or

death of a person or persons and for all damages arising out of injury to or destruction of property arising directly or indirectly out of or in connection with the performance of the work under this Division of the Specifications, and from the Contractor’s negligence in the performance of the work described in the construction contract documents, but not including liability that may be due to the sole negligence of the Owner, the Engineer, their Consultants or their officers, agents and employees.

PART 2 PRODUCTS

2.1 STANDARD OF QUALITY:

A. Material and Equipment: Provide materials and equipment that are new and are current products of manufacturers regularly engaged in the production of such products. The standard products shall have been in satisfactory commercial or industrial use for two years prior to bid opening. The two-year period includes use of equipment and materials of similar size under similar circumstances. For uniformity, only one manufacturer will be accepted for each type of product.

B. Service Support: Submit a certified list of qualified permanent service organizations including their addresses and qualification for support of the equipment. These service organizations shall be convenient to the equipment installation and able to render service to the equipment on a regular and emergency basis during the warranty period of the contract.

C. Manufacturer’s Recommendations: Where installation procedures are required to be in accordance with manufacturer’s recommendations, furnish printed copies of the recommendations prior to installation. Installation of the item shall not proceed until recommendations are received. Failure to furnish recommendation shall be cause for rejection of the equipment or material.

2.2 FASTENERS:

A. Fasteners for securing equipment to walls, floors and the like shall be either hot-dip galvanized after fabrication or stainless steel.

2.3 FINISH REQUIREMENTS:

A. Equipment: Refer to each electrical equipment section of these Specifications for painting requirements of equipment enclosures. Repair any final paint finish which has been damaged or is otherwise unsatisfactory, to the satisfaction of the Engineer.

B. In finished areas, paint all exposed conduits, boxes and fittings to match the color of the surface to which they are affixed.

PART 3 EXECUTION

3.1 INSTALLATION:

A. Ensure that all equipment and materials fit properly in their installation.

B. Perform any required work to correct improperly fit installation at no additional expense to the Owner.

C. Equipment Installation:
   1. Provide the required inserts, bolts and anchors, and securely attach all equipment and materials to their supports.
   2. In all rooms with concrete floors, install all floor mounted equipment on reinforced concrete pads as shown. Insure that pads are seismically secured to the building structure. The Contractor, suppliers, and fabricators shall take this requirement into consideration when designing, fabricating, and installing panels and other enclosures so that height above the floor of the operating handles of electrical devices meets the requirements of these Specifications and applicable codes.
   3. Mount all metal panels which are mounted on or abutting concrete walls or any outside walls a minimum of ¼ inch from the wall, and paint the back sides of the panels with Bituminous Coating, Rust-oleum C9578 Coal Tar Epoxy Coating or approved equal. Film thickness shall be 10 mils minimum.

D. Cutting, Drilling and Welding:
   1. Provide the required cutting, drilling welding that is required for the electrical construction work. Comply with Division 1 requirements.
   2. Structural members shall not be cut or drilled, except after approval by the Engineer. Use a core drill wherever it is necessary to drill through concrete or masonry.
   3. Provide the required welding for equipment supports. Conduits and fittings shall not be welded to structural steel. Where welding is required, it shall be accomplished by tradesmen certified to do such work. Provide fire and other protection as appropriate.

3.2 FIELD TESTS:

A. Test shall be in accordance with Acceptance Testing specifications issued by the National Electrical Testing Association (NETA).

B. Perform equipment field tests and adjustments. Properly calibrate, adjust and operationally check all circuits and components, and demonstrate as ready for service. Perform each operational check three times to ensure the circuit and components are working properly. Make additional calibration and adjustments if it is determined later that the initial adjustments are not satisfactory for proper performance. Perform equipment field test for equipment where equipment field tests are specified in the equipment Specifications. Give sufficient notice to the Engineer prior to any test so that the tests may be witnessed.

C. Provide instruments, other equipment, temporary facilities as may be necessary, and material required for the tests. These shall be of the type designed for the type of tests to be performed and shall be calibrated by a recognized testing laboratory within three months prior to testing.

D. Operational Tests: Operationally test all circuits to demonstrate that the circuits and equipment have been properly installed and adjusted and are ready for full-time service. Demonstrate the proper functioning of circuits in all modes of operation, including alarm conditions.

E. Re-testing will be required for all unsatisfactory tests after the equipment or system has been repaired. Re-test all related equipment and systems if required by the Engineer. Repair and re-test equipment and systems which have been satisfactorily tested but later fail, until satisfactory performance is obtained.

F. Perform calibration and adjustment on all equipment. Where the values for adjustment are not shown on the Drawings, obtain the proper values from the Engineer.

G. Maintain records of each test and submit five copies to the Engineer when testing is complete. All tests shall be witnessed by the Owner and/or Engineer at their discretion. These records shall include:
   1. Name of equipment tested.
   2. Date of report.
   3. Date of test.
   4. Description of test setup.
   5. Identification and rating of test equipment.
   6. Test results and data.
   7. Name of person performing test.
   8. Owner or Engineer’s initials.

H. Items requiring testing as a minimum:
   1. Ground field grid.
   2. Circuit Breakers.

3.3 PAINTING OF EQUIPMENT:

A. Factory Applied: Electrical equipment shall have factory applied painting system which shall, as a minimum, meet the requirements of NEMA ICS 6 corrosion-resistance test and the additional requirements specified in the technical section.

B. Field Applied: Paint electrical equipment as required to match finish of adjacent surfaces or to meet the indicated or specified safety criteria.

3.4 RECORDS:

A. Maintain one copy of the contract Drawing Sheets on the site of the work for recording the record “as built” condition. After completion of the work, the Contractor shall neatly and carefully mark the work as actually constructed, revising, deleting and adding to the Drawing Sheets as required. The following requirements shall be complied with:

1. Drawings and associated as-built changes shall be completed in AutoCAD or Revit and submitted in CAD/Revit as well as PDF format. Documents with hand-written changes or with RFI responses and field sketches pasted on shall not be acceptable. Engineer shall make digital backgrounds of original contract documents available for Contractor's use upon request.
2. Cable Size and Type: Provide the size and type of each cable installed on the project.
3. Substructure: Where the location of duct lines, adjacent utilities, cable boxes, and manholes are found to different than shown, carefully mark the correct location on the Drawings. Work shall be dimensioned from existing improvements.
4. Record (As Built) Drawings: At the completion of the Work the Contractor shall provide a set of record "as built" drawings over to the Owner for his use.
   a. Record drawings are required to be transmitted within 30 days of beneficial occupancy.
   b. Transmittal and approval process:
      1) Contractor is to transmit one digital copy for review and comment.
      2) After acceptance of the above, the Contractor is to transmit three printed sets and one digital reproducible set.
      3) Contractor to provide information on their company in the margin of record drawings along with the date of the revisions and the associated revision number.

3.5 POSTED OPERATING INSTRUCTIONS:

A. Provide for each system and principal item of equipment as specified in the technical sections for use by operation and maintenance personnel. The operating instructions shall include the following:
   1. Single line diagrams, wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment at each major piece of distribution equipment.
   2. Start up, proper adjustments, operating, lubrication and shutdown procedures.
   3. Safety precautions.
   4. The procedure in the event of equipment failure.
   5. Other items of instruction as recommended by the manufacturer of each system or item of equipment.

B. Instruction to Owner's Personnel:
   1. Where specified in the technical sections, furnish the services of competent instructors to give full instruction to designated personnel in the adjustment, operation and maintenance of the specified systems and equipment, including pertinent safety requirements as required. Instructors shall be thoroughly familiar with all parts of the installation and shall be trained in operating theory as well as practical operation and maintenance work. Instruction shall be given during the first regular work week after the equipment or systems has been accepted and

turned over to the Owner for regular operation. The number of man-days (8 hours per day) of instruction furnished shall be as specified in the individual section. When more than 4 man-days of instruction are specified, use approximately half of the time for classroom instruction. Use other time for field instruction with equipment or system. When significant changes or modifications in the equipment or system are made under the terms of the contract, provide additional instructions to acquaint the operating personnel with the changes or modifications.

2. Contractor shall video record all training sessions and shall provide the Owner with a copy of the recording at the conclusion of the training. Recording shall be in digital video format (MP4, AVI, or similar) and shall be provided on USB stick or DVD labeled with the Contractor’s contact information, the training topic, and date of training.
3. Contractor shall maintain an attendance sheet from each session which contains the following information:
   a. Attendees with associated arrival and departure time.
   b. Topics covered.
   c. Information provided.
   d. Signatures of attendees taken at the completion of the session.

3.6 CLEAN UP:

A. Thoroughly clean all soiled surfaces of installed equipment and materials, including, but not limited to, removal of all dirt, dust, debris, and unused construction materials.

B. Upon completion of electrical work, remove all surplus materials, rubbish, and debris that accumulated during the construction work. Leave the entire area neat, clean, and acceptable to the Engineer.

(1)

(2) **Substitution Request Form**

(3)

(4) Project Name: ________________________

(5) Request Date: ________________________

(6)

(7) Submittal Name: ______________________

(8) Submittal Number: ____________________

(9)

(10) Reason for Substitution Request (check all that apply):

(11)

	Reason	Additional Information
☐	Cost savings to the owner	*(Note cost savings here)*
☐	A product with features providing additional benefits to the end user	*(Note benefits here)*
☐	Improved finished environment, lay out of the final installation, or space savings over the specified equipment	*(Note benefits here)*
☐	Delivery considerations	*(Note schedule savings here)*
☐	Owner’s specific requests	*(Note requested change and who made request here)*

(12)

(13) Product Data Information (provide one line per performance characteristic):

Property	**Specified**	**Substitution**	**Meets**	**Exceeds**
(e.g. Thermal Rating)	*(e.g. 90° C)*	*(e.g. 90° C)*	☒	☐
			☐	☐
			☐	☐
			☐	☐
			☐	☐
			☐	☐
			☐	☐
			☐	☐
			☐	☐
			☐	☐
			☐	☐
			☐	☐

(14)

END OF SECTION

SECTION 26 05 05
SELECTIVE DEMOLITION FOR ELECTRICAL

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Electrical demolition.

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. Materials and equipment for patching and extending work: As specified in individual sections.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that abandoned wiring and equipment serve only abandoned facilities.

B. Demolition drawings are based on casual field observation and existing record documents.

C. Report discrepancies to Architect before disturbing existing installation.

D. Beginning of demolition means installer accepts existing conditions.

3.2 PREPARATION

A. Disconnect electrical systems in walls, floors, and ceilings to be removed.

B. Coordinate utility service outages with utility company.

C. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations.

D. Existing Electrical Service: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switchovers and connections. Minimize outage duration.

1. Obtain permission from Owner at least 24 hours before partially or completely disabling system.
2. Make temporary connections to maintain service in areas adjacent to work area.

E. Existing Fire Alarm System: Maintain existing system in service until new system is accepted. Disable system only to make switchovers and connections. Minimize outage duration.

1. Notify Owner before partially or completely disabling system.
2. Notify local fire service.
3. Make notifications at least 24 hours in advance.
4. Make temporary connections to maintain service in areas adjacent to work area.

F. Existing Telephone System: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switchovers and connections. Minimize outage duration.
   1. Notify Owner at least 24 hours before partially or completely disabling system.
   2. Notify telephone utility company at least 24 hours before partially or completely disabling system.
   3. Make temporary connections to maintain service in areas adjacent to work area.

3.3 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

A. Perform work for removal and disposal of equipment and materials containing toxic substances regulated under the Federal Toxic Substances Control Act (TSCA) in accordance with applicable federal, state, and local regulations. Applicable equipment and materials include, but are not limited to:
   1. PCB-containing electrical equipment, including transformers, capacitors, and switches.
   2. PCB- and DEHP-containing lighting ballasts.
   3. Mercury-containing lamps and tubes, including fluorescent lamps, high intensity discharge (HID), arc lamps, ultra-violet, high pressure sodium, mercury vapor, ignitron tubes, neon, and incandescent.

B. Remove, relocate, and extend existing installations to accommodate new construction.

C. Remove abandoned wiring to source of supply.

D. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.

E. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets that are not removed.

F. Disconnect and remove abandoned panelboards and distribution equipment.

G. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.

H. Disconnect and remove abandoned luminaires. Remove brackets, stems, hangers, and other accessories.

I. Repair adjacent construction and finishes damaged during demolition and extension work.

J. Maintain access to existing electrical installations that remain active. Modify installation or provide access panel as appropriate.

K. Extend existing installations using materials and methods compatible with existing electrical installations, or as specified.

3.4 CLEANING AND REPAIR

A. See Section 01 74 19 - Construction Waste Management and Disposal for additional requirements.
B. Clean and repair existing materials and equipment that remain or that are to be reused.
C. Panelboards: Clean exposed surfaces and check tightness of electrical connections. Replace damaged circuit breakers and provide closure plates for vacant positions. Provide typed circuit directory showing revised circuiting arrangement.
D. Luminaires: Remove existing luminaires for cleaning. Use mild detergent to clean all exterior and interior surfaces; rinse with clean water and wipe dry. Replace lamps, ballasts and broken electrical parts.

END OF SECTION

SECTION 26 0526
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Grounding and bonding requirements.
B. Conductors for grounding and bonding.
C. Connectors for grounding and bonding.

1.2 RELATED REQUIREMENTS

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

1.3 REFERENCE STANDARDS

A. IEEE 81 - IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System; 2012.
B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
C. NETA ATS - Standard For Acceptance Testing Specifications For Electrical Power Equipment And Systems; 2021.
D. CEC – California Electrical Code; 2022 Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
E. UL 467 - Grounding and Bonding Equipment; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
1. Verify exact locations of underground metal water service pipe entrances to building.
2. Coordinate the work with other trades to provide steel reinforcement complying with specified requirements for concrete-encased electrode.
3. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.5 SUBMITTALS

A. Product Data: Provide manufacturer's standard catalog pages and data sheets for grounding and bonding system components.
B. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

C. Field quality control test reports.
D. Project Record Documents: Record actual locations of grounding electrode system components and connections.

1.6 QUALITY ASSURANCE

A. Comply with requirements of CEC.
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.

1.7 DELIVERY, STORAGE, AND HANDLING

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

PART 2 PRODUCTS

2.1 GROUNDING AND BONDING REQUIREMENTS

A. Existing Work: Where existing grounding and bonding system components are indicated to be reused, they may be reused only where they are free from corrosion, integrity and continuity are verified, and where acceptable to the authority having jurisdiction.
B. Do not use products for applications other than as permitted by CEC and product listing.
C. 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.
D. Where conductor size is not indicated, size to comply with CEC but not less than applicable minimum size requirements specified.
E. 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 5 ohms to ground, when tested according to IEEE 81 using "fall-of-potential" method.
   3. Between Grounding Electrode System and Major Electrical Equipment Frames, System Neutral, and Derived Neutral Points: Not greater than 0.5 ohms, when tested using "point-to-point" methods.
F. Bonding and Equipment Grounding:
   1. Provide bonding for equipment grounding conductors, equipment ground busses, metallic equipment enclosures, metallic raceways and boxes, device grounding

terminals, and other normally non-current-carrying conductive materials enclosing electrical conductors/equipment or likely to become energized as indicated and in accordance with CEC.

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 CEC.
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.
7. Provide bonding for interior metal piping systems in accordance with CEC. This includes, but is not limited to:
   a. Metal water piping where not already effectively bonded to metal underground water pipe used as grounding electrode.
   b. Metal gas piping.
8. Provide bonding for metal building frame.

G. Communications Systems Grounding and Bonding:
1. Provide intersystem bonding termination at service equipment or metering equipment enclosure and at disconnecting means for any additional buildings or structures in accordance with CEC.
2. Provide bonding jumper in raceway from intersystem bonding termination to each communications room or backboard and provide ground bar for termination.
   a. Bonding Jumper Size: 6 AWG, unless otherwise indicated or required.
   b. Ground Bar Size: 1/4 by 2 by 12 inches unless otherwise indicated or required.
   c. Ground Bar Mounting Height: 18 inches above finished floor unless otherwise indicated.

2.2 GROUNDING AND BONDING COMPONENTS

A. General Requirements:
1. Provide products listed, classified, and labeled as suitable for the purpose intended.
2. Provide products listed and labeled as complying with UL 467 where applicable.

B. Conductors for Grounding and Bonding, in Addition to Requirements of Section 26 05 26:
1. Use insulated copper conductors unless otherwise indicated.
   a. Exceptions:

1) Use bare copper conductors where installed underground in direct contact with earth.
2) Use bare copper conductors where directly encased in concrete (not in raceway).

C. Connectors for Grounding and Bonding:
1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.
2. Unless otherwise indicated, use exothermic welded connections for underground, concealed and other inaccessible connections.
3. Unless otherwise indicated, use exothermic welded connections for accessible connections.
4. Manufacturers - Exothermic Welded Connections:

D. Ground Bars:
1. Description: Copper rectangular ground bars with mounting brackets and insulators.
2. Size: As indicated.
3. Holes for Connections: As indicated or as required for connections to be made.
4. Manufacturers:

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that work likely to damage grounding and bonding system components has been completed.
B. Verify that field measurements are as indicated.
C. Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

A. Install products in accordance with manufacturer's instructions.
B. Perform work in accordance with NECA 1 (general workmanship).
C. Make grounding and bonding connections using specified connectors.
1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.
2. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.
3. Exothermic Welds: Make connections using molds and weld material suitable for the items to be connected in accordance with manufacturer's recommendations.
4. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.

5. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.

D. Identify grounding and bonding system components in accordance with Section 26 05 53.

3.3 FIELD QUALITY CONTROL

A. Inspect and test in accordance with NETA ATS except Section 4.

B. Perform inspections and tests listed in NETA ATS, Section 7.13.

C. Perform ground electrode resistance tests under normally dry conditions. Precipitation within the previous 48 hours does not constitute normally dry conditions.

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

E. Submit detailed reports indicating inspection and testing results and corrective actions taken.

END OF SECTION

SECTION 26 05 33.13
CONDUIT FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Galvanized steel rigid metal conduit (RMC).
B. Flexible metal conduit (FMC).
C. Liquidtight flexible metal conduit (LFMC).
D. Galvanized steel electrical metallic tubing (EMT).
E. Rigid polyvinyl chloride (PVC) conduit.
F. High-density polyethylene (HDPE) conduit.

1.2 RELATED REQUIREMENTS

A. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
   1. Includes additional requirements for fittings for grounding and bonding.
B. Section 26 05 33.16 - Boxes for Electrical Systems.
C. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

1.3 REFERENCE STANDARDS

A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC); 2020.
B. ANSI C80.3 - American National Standard for Electrical Metallic Tubing -- Steel (EMT-S); 2020.
C. ANSI C80.6 - American National Standard for Electrical Intermediate Metal Conduit; 2018.
D. ASTM D1002 - Standard Test Method for Apparent Shear Strength of Single-Lap-Joint Adhesively Bonded Metal Specimens by Tension Loading (Metal-to-Metal); 2010 (Reapproved 2019).
E. ASTM D1598 - Standard Test Methods for Time-to-Failure of Plastic Pipe Under Constant Internal Pressure; 2021.
F. ASTM D1599 - Standard Test Method for Resistance to Short-Time Hydraulic Pressure of Plastic Pipe, Tubing, and Fittings; 2018.

G. ASTM D2683 - Standard Specification for Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing; 2020.
H. ASTM D3261 - Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing; 2016.
I. ASTM F1055 - Standard Specification for Electrofusion Type Polyethylene Fittings for Outside Diameter Controlled Polyethylene and Crosslinked Polyethylene (PEX) Pipe and Tubing; 2016a (Reapproved 2022).
J. ASTM F2160 - Standard Specification for Solid Wall High Density Polyethylene (HDPE) Conduit Based on Controlled Outside Diameter (OD); 2016.
K. ASTM F2176 - Standard Specification for Mechanical Couplings Used on Polyethylene Conduit, Duct and Innerduct; 2017.
L. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
M. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT); 2020.
N. NECA 111 - Standard for Installing Nonmetallic Raceways (RNC, ENT, LFNC); 2017.
O. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2014.
P. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit; 2020.
Q. NEMA TC 3 - Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing; 2021.
R. NEMA TC 7 - Solid-Wall Coilable and Straight Electrical Polyethylene Conduit; 2021.
S. CEC - California Electrical Code; 2022 Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
T. UL 1 - Flexible Metal Conduit; Current Edition, Including All Revisions.
U. UL 6 - Electrical Rigid Metal Conduit-Steel; Current Edition, Including All Revisions.
V. UL 360 - Liquid-Tight Flexible Metal Conduit; Current Edition, Including All Revisions.
W. UL 514B - Conduit, Tubing, and Cable Fittings; Current Edition, Including All Revisions.
X. UL 651 - Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings; Current Edition, Including All Revisions.
Y. UL 651A - Schedule 40 and 80 High Density Polyethylene (HDPE) Conduit; Current Edition, Including All Revisions.
Z. UL 746C - Polymeric Materials – Use in Electrical Equipment Evaluations; Current Edition, Including All Revisions.

AA. UL 797 - Electrical Metallic Tubing-Steel; Current Edition, Including All Revisions.
BB. UL 1203 - Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations; Current Edition, Including All Revisions.

CC. UL 1242 - Electrical Intermediate Metal Conduit-Steel; Current Edition, Including All Revisions.

DD. UL 2419 - Outline of Investigation for Electrically Conductive Corrosion Resistant Compounds;

Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
1. Coordinate minimum sizes of conduits with actual type and quantity of conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
2. Coordinate arrangement of conduits with structural members, ductwork, piping, equipment, and other potential conflicts.
3. Verify exact conduit termination locations required for boxes, enclosures, and equipment.
4. Coordinate work to provide roof penetrations that preserve integrity of roofing system and do not void roof warranty.
5. Notify Architect of conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

B. Sequencing:
1. Do not begin installation of conductors and cables until installation of conduit between termination points is complete.

1.5 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, conduits embedded within concrete slabs, and conduits 2-inch (53 mm) trade size and larger.

1.6 QUALITY ASSURANCE

A. Product Listing Organization Qualifications: Organization recognized by OSHA as Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store conduit and fittings in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.1 CONDUIT APPLICATIONS

A. Do not use conduit and associated fittings for applications other than as permitted by CEC, manufacturer's instructions, and product listing.

B. Unless otherwise indicated and where not otherwise restricted, use conduit types indicated for specified applications. Where more than one listed application applies, comply with most restrictive requirements. Where conduit type for 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 or HDPE.
   3. Exterior, Embedded Within Concrete: Use rigid PVC conduit.
   4. Where rigid polyvinyl chloride (PVC) conduit or high-density polyethylene (HDPE) conduit is provided, transition to galvanized steel rigid metal conduit (RMC) where emerging from underground.
   5. Where rigid polyvinyl (PVC) conduit larger than 2-inch (53 mm) trade size is provided, use galvanized steel rigid metal conduit (RMC) elbows for bends.
   6. Where galvanized steel rigid metal conduit (RMC) or galvanized steel intermediate metal conduit (IMC) is installed in direct contact with earth, use corrosion protection tape, factory-applied corrosion protection coating, or field-applied corrosion protection compound acceptable to authorities having jurisdiction to provide supplementary corrosion protection.
   7. 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.

D. Embedded Within Concrete:
   1. Within Slab on Grade (within structural slabs only where approved by Structural Engineer): Use rigid PVC conduit.
   2. Within Slab Above Ground (within structural slabs only where approved by Structural Engineer): Use rigid PVC conduit.
   3. Within Concrete Walls Above Ground: Use rigid PVC conduit.
   4. Where rigid polyvinyl (PVC) conduit is provided, transition to galvanized steel rigid metal conduit (RMC) where emerging from concrete.
   5. Where galvanized steel electrical metallic tubing (EMT) or galvanized steel rigid metal conduit (RMC) emerges from concrete into salt air, use corrosion protection tape, factory-applied corrosion protection coating, or field-applied corrosion protection compound acceptable to authorities having jurisdiction to provide supplementary corrosion protection for minimum of 4 inches on either side of where conduit emerges.

E. Concealed Within Hollow Masonry Walls: Use galvanized steel rigid metal conduit or electrical metallic tubing (EMT).

F. Concealed Within Hollow Stud Walls: Use electrical metallic tubing (EMT).

G. Concealed Above Accessible Ceilings: Use electrical metallic tubing (EMT).

H. Interior, Damp or Wet Locations: Use galvanized steel rigid metal conduit (RMC).

I. Exposed, Interior, Not Subject to Physical Damage: Use electrical metallic tubing (EMT).

J. 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.
      b. Where exposed below 20 feet in warehouse areas.

K. Exposed, Exterior: Use galvanized steel rigid metal conduit.

L. Concealed, Exterior, Not Embedded in Concrete or in Contact With Earth: Use galvanized steel rigid metal conduit or electrical metallic tubing (EMT).

M. Flexible Connections to Luminaires Above Accessible Ceilings: Use flexible metal conduit (FMC).
   1. Maximum Length: 6 feet.

N. Flexible Connections to Vibrating Equipment:
   1. Dry Locations: Use flexible metal conduit (FMC).
   2. Damp, Wet, or Corrosive Locations: Use liquidtight flexible metal conduit (LFMC).
   3. Maximum Length: 6 feet unless otherwise indicated.
   4. Vibrating equipment includes, but is not limited to:
      a. Transformers.
      b. Motors.

2.2 CONDUIT - GENERAL REQUIREMENTS

A. Comply with CEC.

B. Fittings for Grounding and Bonding: See Section 26 05 26 for additional requirements.

C. Provide conduit, fittings, supports, and accessories required for complete raceway system.

D. Provide products listed, classified, and labeled as suitable for purpose intended.

E. Minimum Conduit Size, Unless Otherwise Indicated:
   1. Branch Circuits: 3/4 inch (21 mm) trade size.
   2. Underground, Interior: 1 inch (27 mm) trade size.
   3. Underground, Exterior: 1-inch trade size.

F. Where conduit size is not indicated, size to comply with CEC but not less than applicable minimum size requirements specified.

2.3 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

A. Manufacturers:
   1. Allied Tube & Conduit, a division of Atkore International: www.alliedeg.com/#sle.
   2. Western Tube, a division of Zekelman Industries: www.westerntube.com/#sle.
   3. Wheatland Tube, a division of Zekelman Industries: www.wheatland.com/#sle.

B. Conduit with integral fittings, such as Allied Tube and Conduit's "Kwik-Couple" are not permitted.

C. Interior conduits shall be color-coded based on the wiring or system type they serve. Paint shall be factory applied by the manufacturer

1. Normal Power Systems: No color
2. Emergency and Standby Power Systems: Yellow
3. Fire Alarm: Red
4. Security: Orange
5. Telephone and Data: Blue
6. Audio/Visual: Purple
7. Other Low Voltage: Green

D. Description: CEC, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.

E. Fittings:

1. Manufacturers:
   a. ABB; T&B: www.electrification.us.abb.com/#sle.
   b. Allied Tube & Conduit, a division of Atkore International: www.alliedeg.us/#sle.
   c. Emerson Electric Co; O-Z/Gedney: www.emerson.com/#sle.
2. Nonhazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B or UL 6.
3. Hazardous/Classified Locations: Use fittings listed and labeled as complying with UL 1203 for classification of installed location.
4. Material: Use steel or malleable iron.
   a. Do not use die cast zinc fittings.
5. Connectors and Couplings: Use threaded type fittings only. Threadless fittings, including set screw and compression/gland types, are not permitted.

2.4 FLEXIBLE METAL CONDUIT (FMC)

A. Manufacturers:

1. AFC Cable Systems, a division of Atkore International: www.afcweb.com/#sle.

B. Description: CEC, Type FMC standard-wall steel flexible metal conduit listed and labeled as complying with UL 1, and listed for use in classified firestop systems.

C. Fittings:

1. Manufacturers:
   a. ABB; T&B: www.electrification.us.abb.com/#sle.
   b. Emerson Electric Co; O-Z/Gedney: www.emerson.com/#sle.
2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
3. Material: Use steel or malleable iron.

a. Do not use die cast zinc fittings.

2.5 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)

A. Manufacturers:
 1. AFC Cable Systems, a division of Atkore International: www.afcweb.com/#sle.
B. Description: CEC, Type LFMC polyvinyl chloride (PVC) jacketed steel flexible metal conduit listed and labeled as complying with UL 360.
C. Fittings:
 1. Manufacturers:
  a. ABB; T&B: www.electrification.us.abb.com/#sle.
  b. Emerson Electric Co; O-Z/Gedney: www.emerson.com/#sle.
 2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 3. Material: Use steel or malleable iron.
  a. Do not use die cast zinc fittings.

2.6 GALVANIZED STEEL ELECTRICAL METALLIC TUBING (EMT)

A. Manufacturers:
 1. Allied Tube & Conduit, a division of Atkore International: www.alliedeg.com/#sle.
 2. Western Tube, a division of Zekelman Industries: www.westerntube.com/#sle.
 3. Wheatland Tube, a division of Zekelman Industries: www.wheatland.com/#sle.
B. Description: CEC, Type EMT galvanized steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.
C. Conduits with integral fittings similar to Allied Tube & Conduit's "Kwik-Fit" shall not be used.
D. Interior conduits shall be color-coded based on the wiring or system type they serve. Paint shall be factory applied by the manufacturer
 1. Normal Power Systems: No color
 2. Emergency and Standby Power Systems: Yellow
 3. Fire Alarm: Red
 4. Security: Orange
 5. Telephone and Data: Blue
 6. Audio/Visual: Purple
 7. Other Low Voltage: Green
E. Fittings:
 1. Manufacturers:
  a. ABB; T&B: www.electrification.us.abb.com/#sle.
  b. Allied Tube & Conduit, a division of Atkore International: www.alliedeg.us/#sle.
  c. Emerson Electric Co; O-Z/Gedney: www.emerson.com/#sle.

2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
3. Material: Use steel or malleable iron.
   a. Do not use die cast zinc fittings.
4. Connectors and Couplings: Use compression/gland or set-screw type.
   a. Do not use indenter type connectors and couplings.

2.7 RIGID POLYVINYL CHLORIDE (PVC) CONDUIT

A. Manufacturers:
   1. ABB; Carlon: www.carlon.com/#sle.
   2. Allied Tube & Conduit, a division of Atkore International: www.alliedeg.com/#sle.
   3. Cantex Inc: www.cantexinc.com/#sle.
B. Description: CEC, 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.
C. Fittings:
   1. Expansion fittings similar to Carlon's "E945" series shall not be used.
   2. Manufacturer: Same as manufacturer of conduit to be connected.
   3. Description: Fittings complying with NEMA TC 3 and listed and labeled as complying with UL 651; material to match conduit.

2.8 HIGH-DENSITY POLYETHYLENE (HDPE) CONDUIT

A. Manufacturers:
   1. ABB; Carlon: www.electrification.us.abb.com/#sle.
   2. Blue Diamond Industries, LLC: www.bdiky.com/#sle.
   3. Eastern Wire + Conduit, a division of Atkore International: www.easternwire.com/#sle.
B. Description: CEC, Type HDPE high-density polyethylene solid-wall conduit complying with ASTM F2160 and NEMA TC 7; list and label as complying with UL 651A; Schedule 40 unless otherwise indicated.
C. Joining Methods: Approved by HDPE conduit manufacturer.
D. Mechanical Fittings: Comply with ASTM F2176; list and label as complying with UL 651A.
E. Butt Heat Fusion Fittings: Comply with ASTM D3261.
F. Socket Fusion Fittings: Comply with ASTM D2683.
G. Electrofusion Fittings: Comply with ASTM F1055.

2.9 ACCESSORIES

A. Corrosion Protection Tape: PVC-based, minimum thickness of 20 mil, 0.020 inch.

B. Conduit Joint Compound: Corrosion-resistant, electrically conductive compound listed as complying with UL 2419; suitable for use with conduit to be installed.
C. Solvent Cement for PVC Conduit and Fittings: As recommended by manufacturer of conduit and fittings to be installed.
D. Adhesive for HDPE Conduit:
   1. Specifically designed for bonding dissimilar materials in lieu of transition fittings, including but not limited to polyethylene, fiberglass, PVC, aluminum, and steel; UL 746C recognized.
   2. Approved by adhesive manufacturer for use with materials to be joined.
   3. Adhesive Shear Strength: Not less that 100 psi, when tested in accordance with ASTM D1002.
   4. Hydrostatic Pressure Resistance: No leaks, when tested in accordance with ASTM D1598 at 120 psi for 1,000 hours and when tested in accordance with ASTM D1599 at 250 psi.
   5. Products:
      a. American Polywater Corporation; Polywater BonDuit Conduit Adhesive: www.polywater.com/#sle.
E. Pull Strings: Use nylon or polyester tape with average breaking strength of not less than 1,250 lbf.
F. Foam Conduit Sealant:
   1. Removable, two-part, closed-cell foam, specifically designed for sealing conduit openings against water, moisture, gases, and dust.
   2. Suitable for use with conductors/cables and associated insulation/jackets to be installed.
   3. Rated to hold minimum of 10 ft water head pressure.
   4. Products:
      a. American Polywater Corporation; Polywater AFT Foam Duct Sealant: www.polywater.com/#sle.
      b. American Polywater Corporation; Polywater FST Foam Duct Sealant: www.polywater.com/#sle.
G. Conduit Mechanical Seals:
   1. Listed as complying with UL 514B.
   2. Specifically designed for sealing conduit openings against water, moisture, gases, and dust.
   3. Suitable for sealing around conductors/cables to be installed.
   4. Products:
      a. American Polywater Corporation; PHRD SG Mechanical Seals: www.polywater-haufftechnik.com/#sle.
H. Sealing Compound for Hazardous/Classified Location Sealing Fittings: Listed for use with particular fittings to be installed.

I. Sealing Systems for Concrete Penetrations:
   1. Sleeves: Provide water stop ring or cement coating that bonds to concrete to prevent water infiltration.
   2. Rate for minimum of 40 psig; suitable for sealing around conduits to be installed.
   3. Products:
      a. American Polywater Corporation; PZVR Cement-Coated Concrete Wall Sleeves: www.polywater-haufftechnik.com/#sle.
      b. American Polywater Corporation; PHSD Mechanical Seals: www.polywater-haufftechnik.com/#sle.
      c. American Polywater Corporation; PHSI 150 Varia Double Wall Inserts: www.polywater-haufftechnik.com/#sle.
      d. American Polywater Corporation; PGKD Modular Seals: www.polywater-haufftechnik.com/#sle.
J. Sealing Systems for Roof Penetrations: Premanufactured components and accessories as required to preserve integrity of roofing system and maintain roof warranty; suitable for conduits and roofing system to be installed; designed to accommodate existing penetrations where applicable.
   1. Products:
      a. Alta Products, LLC; Sigrist Pipe Chase Housing, Curbs, and Exit Seals: www.altaproductsllc.com/#sle.
      b. Menzies Metal Products; Electrical Roof Stack and Cap: www.menzies-metal.com/#sle.
      c. Menzies Metal Products; Electrical Retro Box: www.menzies-metal.com/#sle.
K. Flashing Panels for Exterior Wall Penetrations: Premanufactured components and accessories as required to preserve integrity of building envelope; suitable for conduits and facade materials to be installed.
   1. Products:
      a. Quickflash Weatherproofing Products, Inc: www.quickflashproducts.com/#sle.
L. Duct Bank Spacers: Nonmetallic; designed for maintaining conduit/duct spacing for concrete encasement in open trench installation; suitable for conduit/duct arrangement to be installed.
   1. Products:
      a. Advance Products & Systems, LLC; Duct Bank Spacers: www.apsonline.com/#sle
M. Firestop Sleeves: Listed; provide as required to preserve fire resistance rating of building elements.
   1. Products:
      a. HoldRite, a brand of Reliance Worldwide Corporation; HydroFlame Pro Series/HydroFlame Custom Built: www.holdrite.com/#sle.

N. Bore Spacers: Nonmetallic; designed for maintaining conduit/duct spacing for installation within casing; furnished with roller wheels to facilitate installation, openings to facilitate grout flow, and holes for stabilization cable; suitable for casing and conduit/duct arrangement to be installed.
   1. Products:
      a. Advance Products & Systems, LLC; Bore Spacers: www.apsonline.com/#sle.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as indicated.
B. Verify that mounting surfaces are ready to receive conduits.
C. Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

A. Install products in accordance with manufacturer's instructions.
B. Install conduit in accordance with NECA 1.
C. Install galvanized steel rigid metal conduit (RMC) in accordance with NECA 101.
D. Install intermediate metal conduit (IMC) in accordance with NECA 101.
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 conduits unless specifically indicated to be exposed.
   4. Conduits in the following areas may be exposed, unless otherwise indicated:
      a. Electrical rooms.
      b. Mechanical equipment rooms.
      c. Within joists in areas with no ceiling.
   5. Unless otherwise approved, do not route exposed conduits:
      a. Across floors.
      b. Across top of parapet walls.
      c. Across building exterior surfaces.
   6. Conduits installed underground or embedded in concrete may be routed in shortest possible manner unless otherwise indicated. Route other conduits parallel or perpendicular to building structure and surfaces, following surface contours where practical.
   7. Arrange conduit to maintain adequate headroom, clearances, and access.
   8. For power conduits, arrange conduit to provide no more than the equivalent of three 90 degree bends between pull points.

9. For low voltage conduits, arrange conduit to provide no more than the equivalent of two 90 degree bends between pull points.
10. Arrange conduit to provide no more than 150 feet between pull points.
11. Route conduits above water and drain piping where possible.
12. Arrange conduit to prevent moisture traps. Provide drain fittings at low points and at sealing fittings where moisture may collect.
13. Maintain minimum clearance of 6 inches between conduits and piping for other systems.
14. 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.
15. Group parallel conduits in same area on common rack.

G. Conduit Support:
1. Secure and support conduits in accordance with CEC using suitable supports and methods approved by authorities 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 nonpenetrating rooftop supports to support conduits routed across rooftops, 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.
11. Where conduit support intervals specified in CEC and NECA standards differ, comply with most stringent requirements.

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, insulated throats, or listed metal fittings with smooth, rounded edges at conduit terminations to protect conductors.
7. Secure joints and connections to provide 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. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.
6. 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.
7. Provide metal escutcheon plates for conduit penetrations exposed to public view.
8. Install firestopping to preserve fire resistance rating of partitions and other elements.

J. Conduit Sealing:
1. Use foam conduit sealant to prevent entry of moisture and gases. This includes, but is not limited to:
   a. Where conduits enter building from outside.
   b. Where service conduits enter building from underground distribution system.
   c. Where conduits enter building from underground.
   d. Where conduits may transport moisture to contact live parts.
2. Where conduits cross barriers between areas of potential substantial temperature differential, use foam conduit sealant at accessible point near penetration to prevent condensation. This includes, but is not limited to:
   a. Where conduits pass from outdoors into conditioned interior spaces.
   b. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.
   c. Where conduits penetrate coolers or freezers.
3. Where conduits cross boundaries of hazardous/classified locations, provide identified/listed sealing fittings or conduit mechanical seals as approved by authorities having jurisdiction; locate as indicated or in accordance with CEC.

K. Provide pull string in each empty conduit and in conduits where conductors and cables are to be installed by others. Leave minimum slack of 12 inches at each end.

L. Provide grounding and bonding; see Section 26 05 26.

M. Identify conduits; see Section 26 05 53.

3.3 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. Correct deficiencies and replace damaged or defective conduits.

3.4 CLEANING

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

3.5 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

SECTION 26 05 33.16
BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Outlet and device boxes up to 100 cubic inches, including those used as junction and pull boxes.
B. Cabinets and enclosures, including junction and pull boxes larger than 100 cubic inches.
C. Floor boxes.
D. Underground boxes/enclosures.
E. Accessories.

1.2 RELATED REQUIREMENTS

A. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
B. Section 26 05 33.13 - Conduit for Electrical Systems:
   1. Conduit bodies and other fittings.
   2. Additional requirements for locating boxes to limit conduit length and/or number of bends between pulling points.
C. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

1.3 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
B. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2016.
C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2020.
D. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2014.
E. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports; 2013 (Reaffirmed 2020).
F. CEC - California Electrical Code; 2022 Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
G. SCTE 77 - Specifications for Underground Enclosure Integrity; 2017.

H. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.
I. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.
J. UL 508A - Industrial Control Panels; Current Edition, Including All Revisions.
K. UL 514A - Metallic Outlet Boxes; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by CEC.
   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 CEC.
   4. Coordinate minimum sizes of pull boxes with the actual installed arrangement of connected conduits, calculated according to CEC.
   5. Coordinate the placement of boxes with millwork, furniture, devices, equipment, etc. installed under other sections or by others.
   6. Coordinate the work with other trades to preserve insulation integrity.
   7. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted boxes where indicated.
   8. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.5 SUBMITTALS

A. Product Data: Provide manufacturer's standard catalog pages and data sheets for cabinets and enclosures, floor boxes, and underground boxes/enclosures.
   1. Underground Boxes/Enclosures: Include reports for load testing in accordance with SCTE 77 certified by a professional engineer or an independent testing agency upon request.
B. Project Record Documents: Record actual locations for outlet and device boxes, pull boxes, cabinets and enclosures, floor boxes, and underground boxes/enclosures.
C. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 60 00 - Product Requirements, for additional provisions.
   2. Keys for Lockable Enclosures: Two of each different key.

1.6 QUALITY ASSURANCE

A. Comply with requirements of CEC.

B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.7 DELIVERY, STORAGE, AND HANDLING

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

PART 2 PRODUCTS

2.1 BOXES

A. General Requirements:
1. Do not use boxes and associated accessories for applications other than as permitted by CEC 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 CEC but not less than applicable minimum size requirements specified.
5. Provide grounding terminals within boxes where equipment grounding conductors terminate.

B. Outlet and Device Boxes Up to 100 cubic inches, 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.
3. Use cast iron boxes or cast aluminum boxes where exposed galvanized steel rigid metal conduit is used.
4. Use suitable concrete type boxes where flush-mounted in concrete.
5. Use suitable masonry type boxes where flush-mounted in masonry walls.
6. Use raised covers suitable for the type of wall construction and device configuration where required.
7. Use shallow boxes where required by the type of wall construction.
8. Do not use "through-wall" boxes designed for access from both sides of wall.
9. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
10. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.
11. Boxes for Supporting Luminaires and Ceiling Fans: Listed as suitable for the type and weight of load to be supported; furnished with fixture stud to accommodate mounting of luminaire where required.

12. Gangable or sectional boxes shall not be permitted.
13. 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.
14. Wall Plates: Comply with Section 26 27 26.
15. Manufacturers:
    a. Hubbell Incorporated; RACO Products: www.hubbell-rtb.com/#sle.
    b. O-Z/Gedney, a brand of Emerson Electric Co: www.emerson.com/#sle.
    c. Thomas & Betts Corporation: www.tnb.com/#sle.

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:
    a. Indoor Clean, Dry Locations: Type 1, painted steel.
    b. Outdoor Locations: Type 3R, painted steel.
3. Junction and Pull Boxes Larger Than 100 cubic inches:
    a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.
4. Cabinets and Hinged-Cover Enclosures, Other Than Junction and Pull Boxes:
    a. Provide lockable hinged covers, all locks keyed alike unless otherwise indicated.
5. Finish for Painted Steel Enclosures: Manufacturer's standard grey unless otherwise indicated.
6. Manufacturers:
    a. Cooper B-Line, a division of Eaton Corporation: www.cooperindustries.com/#sle.
    b. Hoffman, a brand of Pentair Technical Products: www.hoffmanonline.com/#sle.
    c. Hubbell Incorporated; Wiegmann Products: www.hubbell-wiegmann.com/#sle.

D. Underground Boxes/Enclosures:
1. Description: In-ground, open bottom boxes furnished with flush, non-skid covers with legend indicating type of service and stainless steel tamper resistant cover bolts.
2. Size: As indicated on drawings.

3. Depth: As required to extend below frost line to prevent frost upheaval, but not less than 12 inches.
4. Provide logo on cover to indicate type of service. Covers shall read as follows for each system type:
   a. Power Systems: "ELECTRICAL"
   b. Site Lighting and/or Pole Lighting: "LIGHTING"
   c. Fire Alarm Systems: "FIRE ALARM"
   d. Other Low Voltage Systems: "COMMUNICATIONS"
5. Applications:
   a. Sidewalks/paved areas 6'-0" wide and smaller and Landscaped Areas Subject Only to Occasional Nondeliberate Vehicular Traffic: Use polymer concrete enclosures, with minimum SCTE 77 Tier 8 load rating.
   b. Parking Lots, Sidewalks/paved areas larger than 6'-0" wide, and in Areas Subject Only To Occasional Vehicular Traffic: Use reinforced concrete enclosures with galvanzed steel checker plate lids, with HS20-44 rating.
   c. Do not use polymer concrete enclosures in areas subject to deliberate vehicular traffic.
6. Polymer Concrete and Reinforced Concrete Underground Boxes/Enclosures: Comply with SCTE 77 and HS20-44.
   a. Manufacturers:
      1) Oldcastle Precast, Inc: www.oldcastleprecast.com/#sle.
   b. Combination fiberglass/polymer concrete boxes/enclosures are not acceptable. Use all-polymer concrete boxes/enclosures.

2.2 ACCESSORIES

A. Flashing Panels for Exterior Wall Penetrations: Premanufactured components and accessories as required to preserve integrity of building envelope; suitable for boxes and facade materials to be installed.
   1. Manufacturers:
      a. Quickflash Weatherproofing Products, Inc: www.quickflashproducts.com/#sle.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as indicated.
B. Verify that mounting surfaces are ready to receive boxes.
C. Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

A. Install products in accordance with manufacturer's instructions.
B. 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 CEC.
D. Provide separate boxes for emergency power and normal power systems.
E. Unless otherwise indicated, provide separate boxes for line voltage and low voltage systems.
F. Flush-mount boxes in finished areas unless specifically indicated to be surface-mounted.
G. Unless otherwise indicated, boxes may be surface-mounted where exposed conduits are indicated or permitted.
H. Box Locations:
    1. Locate boxes to be accessible. Provide access panels in accordance with Section 08 31 00 as required where approved by the Architect.
    2. Unless dimensioned, box locations indicated are approximate.
    3. Locate boxes so that wall plates do not span different building finishes.
    4. Locate boxes so that wall plates do not cross masonry joints.
    5. Unless otherwise indicated, where multiple outlet boxes are installed at the same location at different mounting heights, install along a common vertical center line.
    6. Do not install flush-mounted boxes on opposite sides of walls back-to-back. Provide minimum 6 inches horizontal separation unless otherwise indicated.
    7. Acoustic-Rated Walls: Do not install flush-mounted boxes on opposite sides of walls back-to-back; provide minimum 24 inches horizontal separation.
    8. Fire Resistance Rated Walls: Install flush-mounted boxes such that the required fire resistance will not be reduced.
        a. Do not install flush-mounted boxes on opposite sides of walls back-to-back; provide minimum 24 inches separation where wall is constructed with individual noncommunicating stud cavities or protect both boxes with listed putty pads.
        b. Do not install flush-mounted boxes with area larger than 16 square inches or such that the total aggregate area of openings exceeds 100 square inches for any 100 square feet of wall area.
    9. 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.
    10. Outlet boxes shall be installed at the locations and elevations shown on the drawings or specified herein. Make adjustments to locations as required by structural conditions and to suit coordination requirements of other trades.
    11. Locate switch outlet boxes on the latch side of doorways unless otherwise indicated.
    12. Locate junction and pull boxes in the following areas, unless otherwise indicated or approved by the Architect:

13. Outlet boxes shall not be installed back to back nor shall through-wall boxes be permitted.
14. For boxes mounted in exterior walls, make sure that there is insulation behind outlet boxes to prevent condensation in boxes.
15. For outlets mounted above counters, benches or backsplashes, coordinate location and mounting heights with built-in units. Adjust mounting height with required location for equipment served.
    a. Concealed above accessible suspended ceilings.
    b. Within joists in areas with no ceiling.
    c. Electrical rooms.
    d. Mechanical equipment rooms.

I. Box Supports:
1. Secure and support boxes in accordance with CEC and Section 26 05 29 using suitable supports and methods approved by the authority having jurisdiction.
2. Provide required seismic controls in accordance with Section 26 05 48.
3. 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 CEC. Do not provide support from piping, ductwork, or other systems.
4. Installation Above Suspended Ceilings: Do not provide support from ceiling grid or ceiling support system.
5. Use far-side support to secure flush-mounted boxes supported from single stud in hollow stud walls. Repair or replace supports for boxes that permit excessive movement.

J. Install boxes plumb and level.

K. Flush-Mounted Boxes:
1. Install boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that front edge of box or associated raised cover is not set back from finished surface more than 1/4 inch or does not project beyond finished surface.
2. Install boxes in combustible materials such as wood so that front edge of box or associated raised cover is flush with finished surface.
3. Repair rough openings around boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that there are no gaps or open spaces greater than 1/8 inch at the edge of the box.

L. Install boxes as required to preserve insulation integrity.

M. Underground Boxes/Enclosures:
1. Install enclosure on gravel base, minimum 6 inches deep.
2. Flush-mount enclosures located in concrete or paved areas.
3. Mount enclosures located in landscaped areas with top at 1 inch above finished grade.

4. Install additional bracing inside enclosures in accordance with manufacturer's instructions to minimize box sidewall deflections during backfilling. Backfill with cover bolted in place.

N. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
O. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 84 00.
P. Close unused box openings.
Q. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use. Leave no unused openings in any box. Install close-up plugs as required to seal all openings and removed knockouts.
R. Provide grounding and bonding in accordance with Section 26 05 26.
S. Identify boxes in accordance with Section 26 05 53.

3.3 CLEANING

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

3.4 PROTECTION

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

END OF SECTION

SECTION 26 05 53
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Electrical identification requirements.
B. Identification nameplates and labels.
C. Wire and cable markers.
D. Voltage markers.
E. Underground warning tape.
F. Floor marking tape.
G. Warning signs and labels.

1.2 RELATED REQUIREMENTS

A. Section 27 10 00 - Structured Cabling: Identification for communications cabling and devices.

1.3 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. CEC - California Electrical Code; 2022 Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
D. UL 969 - Marking and Labeling Systems; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

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

B. Sequencing:
   1. Do not conceal items to be identified, in locations such as above suspended ceilings, until identification products have been installed.
   2. Do not install identification products until final surface finishes and painting are complete.

1.5 SUBMITTALS

A. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product.

1.6 QUALITY ASSURANCE

A. Comply with requirements of CEC.

1.7 FIELD CONDITIONS

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

PART 2 PRODUCTS

2.1 IDENTIFICATION REQUIREMENTS

A. Identification for Equipment:
   1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.
      a. Switchboards:
         1) Identify ampere rating.
         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 load(s) served for each branch device. Do not identify spares and spaces.
      b. Panelboards:
         1) Identify ampere rating.
         2) Identify voltage and phase.
         3) Identify power source and circuit number. Include location when not within sight of equipment.
         4) Identify main overcurrent protective device. Use identification label for panelboards with a door. For power distribution panelboards without a door, use identification nameplate.
         5) Use typewritten circuit directory to identify load(s) served for panelboards with a door. Identify spares and spaces using pencil.
         6) For power panelboards without a door, use identification nameplate to identify load(s) served for each branch device. Do not identify spares and spaces.
      c. Transformers:

1) Identify kVA rating.
2) Identify voltage and phase for primary and secondary.
3) Identify power source and circuit number. Include power source location when not within sight of equipment.
4) Identify load(s) served. Include load location when not within sight of equipment.

d. Enclosed switches, circuit breakers, and motor controllers:
1) Identify voltage and phase.
2) Identify power source and circuit number. Include power source location when not within sight of equipment.
3) Identify load(s) served. Include load location when not within sight of equipment.

e. Time Switches:
1) Identify load(s) served and associated circuits controlled. Include location.

f. Centralized Emergency Lighting Inverters:
1) Identify input and output voltage and phase.
2) Identify power source and circuit number for normal power source. Include location when not within sight of equipment.
3) Identify load(s) served. Include location.

g. Transfer Switches:
1) Identify voltage and phase.
2) Identify power source and circuit number for both normal power source and standby power source. Include location when not within sight of equipment.
3) Identify load(s) served. Include location when not within sight of equipment.
4) Identify short circuit current rating based on the specific overcurrent protective device type and settings protecting the transfer switch.
5) Identify type of loads served (e.g. Required Emergency, Required Standby, Optional Standby)

h. Electricity Meters:
1) Identify load(s) metered.
2) Unique meter identifier, use identification label.

2. Service Equipment:
a. Use identification nameplate to identify each service disconnecting means.
b. For buildings or structures supplied by more than one service, or any combination of branch circuits, feeders, and services, use identification nameplate or means of identification acceptable to authority having jurisdiction at each service disconnecting means to identify all other services, feeders, and branch circuits supplying that building or structure. Verify format and descriptions with authority having jurisdiction.

3. Emergency System Equipment:
   a. Use identification nameplate or voltage marker to identify emergency system equipment in accordance with CEC.
   b. Use identification nameplate at each piece of service equipment to identify type and location of on-site emergency power sources.
   c. Use identification nameplate to identify emergency operating instructions for emergency system equipment.
4. Use identification nameplate to identify switchboards and panelboards utilizing a high leg delta system in accordance with CEC.
5. Use identification nameplate to identify disconnect location for equipment with remote disconnecting means.
6. Use identification label on inside of door at each fused switch to identify required NEMA fuse class and size.
7. Use identification label to identify overcurrent protective devices for branch circuits serving fire alarm circuits. Identify with text "FIRE ALARM CIRCUIT".
8. Use field-painted floor markings or floor marking tape to identify required equipment working clearances.
9. Available Fault Current Documentation: Use identification label to identify the available fault current and date calculations were performed at locations requiring documentation by CEC including but not limited to the following.
   a. Service equipment.
   b. Industrial control panels.
   c. Motor control centers.
   d. Elevator control panels.
10. Use warning signs to identify electrical hazards for entrances to all rooms and other guarded locations that contain exposed live parts operating at 600 V nominal or less with the word message "DANGER; Electrical hazard; Authorized personnel only" or approved equivalent.
11. Use warning labels, identification nameplates, or identification labels to identify electrical hazards for equipment where multiple power sources are present with the word message "DANGER; Hazardous voltage; Multiple power sources may be present; Disconnect all electric power including remote disconnects before servicing" or approved equivalent.

B. Identification for Conductors and Cables:
   1. 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.

2. 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 2 inch (53 mm) trade size and larger at maximum intervals of 20 feet.
2. Use factory-painted conduits or field painted conduits to identify systems other than normal power system for accessible conduits. Refer to section 26 05 33.13 for color coding and additional requirements.
3. 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.
4. Use identification labels, handwritten text using indelible marker, or plastic marker tags to identify spare conduits at each end. Identify purpose and termination location.
5. 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.
3. Use warning labels to identify electrical hazards for boxes containing exposed live parts or exposed conductors operating at over 600 V nominal with the word message "DANGER; HIGH VOLTAGE; KEEP OUT".

E. Identification for Devices:
1. Identification for Communications Devices: Comply with Section 27 10 00.
2. Use identification label to identify fire alarm system devices.
   a. For devices concealed above suspended ceilings, provide additional identification on ceiling tile below device location.
3. Use identification label to identify serving branch circuit for all receptacles.
4. Use identification label to identify load controlled for wall-mounted control devices controlling loads that are not visible from the control location and for multiple wall-mounted control devices installed at one location.

F. Identification for Luminaires:
1. Use permanent red dot on luminaire frame to identify luminaires connected to emergency power system.

2.2 IDENTIFICATION NAMEPLATES AND LABELS

A. Identification Nameplates:
   1. Manufacturers:
      a. Brimar Industries, Inc: www.brimar.com/#sle.
      b. Seton Identification Products: www.seton.com/#sle.
   2. Materials:
      a. Indoor Clean, Dry Locations: Use plastic nameplates.
      b. Outdoor Locations: Use plastic or aluminum nameplates suitable for exterior use.
   3. 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.
   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. Manufacturers:
      a. Brady Corporation: www.bradyid.com/#sle.
      b. Brother International Corporation: www.brother-usa.com/#sle.
      c. Panduit Corp: www.panduit.com/#sle.
   2. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.
      a. Use only for indoor locations.
   3. 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. System designation where applicable:
         1) Emergency Power System: Identify with text "EMERGENCY".
         2) Standby Power System: Identify with text "STANDBY"
         3) Fire Alarm System: Identify with text "FIRE ALARM".
      b. Equipment designation or other approved description.
   3. Text: All capitalized unless otherwise indicated.
   4. Minimum Text Height:
      a. System Designation: 1 inch.
      b. Equipment Designation: 1/2 inch.

5. Color:
    a. Normal Power System: White text on black background.
    b. Emergency Power System: White text on red background.

D. Format for General Information and Operating Instructions:
    1. Minimum Size: 1 inch by 2.5 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: 1/4 inch.
    5. Color: Black text on white background unless otherwise indicated.

E. 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.

F. 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.

G. 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.

H. Format for Fire Alarm Device Identification:
    1. Minimum Size: 3/8 inch by 1.5 inches.
    2. Legend: Designation indicated and device zone or address.
    3. Text: All capitalized unless otherwise indicated.
    4. Minimum Text Height: 3/16 inch.
    5. Color: Red text on white background.

2.3 WIRE AND CABLE MARKERS

A. Manufacturers:
    1. Brady Corporation: www.bradyid.com/#sle.
    2. HellermannTyton: www.hellermanntyton.com/#sle.

3. Panduit Corp: www.panduit.com/#sle.

B. 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.

C. Markers for Conductor and Cable Bundles: Use plastic marker tags secured by nylon cable ties.

D. Legend: Power source and circuit number or other designation indicated.

E. Text: Use factory pre-printed or machine-printed text, all capitalized unless otherwise indicated.

F. Minimum Text Height: 1/8 inch.

G. Color: Black text on white background unless otherwise indicated.

2.4 VOLTAGE MARKERS

A. Manufacturers:
1. Brady Corporation: www.bradyid.com/#sle.
2. Brimar Industries, Inc: www.brimar.com/#sle.
3. Seton Identification Products: www.seton.com/#sle.

B. Markers for Conduits: Use factory pre-printed self-adhesive vinyl, self-adhesive vinyl cloth, or vinyl snap-around type markers.

C. Markers for Boxes and Equipment Enclosures: Use factory pre-printed self-adhesive vinyl or self-adhesive vinyl cloth type markers.

D. Minimum Size:
1. Markers for Equipment: 1 1/8 by 4 1/2 inches.
2. Markers for Conduits: As recommended by manufacturer for conduit size to be identified.
3. Markers for Pull Boxes: 1 1/8 by 4 1/2 inches.
4. Markers for Junction Boxes: 1/2 by 2 1/4 inches.

E. Legend:
1. Markers for Voltage Identification: Highest voltage present.
2. Markers for System Identification:
   a. Emergency Power System: Text "EMERGENCY".

F. Color: Black text on orange background unless otherwise indicated.

2.5 UNDERGROUND WARNING TAPE

A. Manufacturers:
1. Brady Corporation: www.bradyid.com/#sle.
2. Brimar Industries, Inc: www.brimar.com/#sle.
3. Seton Identification Products: www.seton.com/#sle.

B. Materials: Use foil-backed detectable type polyethylene tape suitable for direct burial, unless otherwise indicated.

C. Foil-backed Detectable Type Tape: 3 inches wide, with minimum thickness of 5 mil, unless otherwise required for proper detection.

D. Legend: Type of service, continuously repeated over full length of tape.

E. Color:
   1. Tape for Buried Power Lines: Black text on red background.
   2. Tape for Buried Communication, Alarm, and Signal Lines: Black text on orange background.

2.6 FLOOR MARKING TAPE

A. Manufacturers:
   1. Brady Corporation: www.bradyid.com/#sle.
   2. Brimar Industries, Inc: www.brimar.com/#sle.
   3. Seton Identification Products: www.seton.com/#sle.

B. Floor Marking Tape for Equipment Working Clearance Identification: Self-adhesive vinyl or polyester tape with overlaminate, 3 inches wide, with alternating black and white stripes.

2.7 WARNING SIGNS AND LABELS

A. Manufacturers:
   1. Brimar Industries, Inc: www.brimar.com/#sle.
   2. Clarion Safety Systems, LLC: www.clarionsafety.com/#sle.
   3. Seton Identification Products: www.seton.com/#sle.

B. Comply with ANSI Z535.2 or ANSI Z535.4 as applicable.

C. Warning Signs:
   1. Materials:
      a. Indoor Dry, Clean Locations: Use factory pre-printed rigid plastic or self-adhesive vinyl signs.
      b. Outdoor Locations: Use factory pre-printed rigid aluminum signs.
   2. Rigid Signs: Provide four mounting holes at corners for mechanical fasteners.
   3. Minimum Size: 7 by 10 inches unless otherwise indicated.

D. 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

3.1 PREPARATION

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

3.2 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. Secure rigid signs using stainless steel screws.

H. Mark all handwritten text, where permitted, to be neat and legible.

3.3 FIELD QUALITY CONTROL

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

END OF SECTION

SECTION 26 05 83

WIRING CONNECTIONS

PART 1 GENERAL

1.1SECTION INCLUDES

A. Electrical connections to equipment.

1.2 RELATED REQUIREMENTS

A. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables.
B. Section 26 05 33.13 - Conduit for Electrical Systems.
C. Section 26 05 33.16 - Boxes for Electrical Systems.

1.3 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. CEC - California Electrical Code; 2022 Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.4 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.

1.5 SUBMITTALS

A. Product Data: Provide wiring device manufacturer’s catalog information showing dimensions, configurations, and construction.

1.6 QUALITY ASSURANCE

A. Comply with requirements of CEC.
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

2.1 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: CEC, 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.

B. Disconnect Switches: As specified in Section 26 28 16.16 and in individual equipment sections.

C. Wiring Devices: As specified in Section 26 27 26.

D. Flexible Conduit: As specified in Section 26 05 33.13.

E. Wire and Cable: As specified in Section 26 05 19.

PART 3 EXECUTION

3.1 EXAMINATION

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

3.2 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.

END OF SECTION