

SALT LAKE CITY CORPORATION
THE DEPARTMENT OF PUBLIC UTILITIES

PROJECT MANUAL FOR CONSTRUCTION OF

SLCPU WEST CAMPUS

(TENANT IMPROVEMENT)

PROJECT NO. 512102522

FISCAL YEAR 2019



Public
Utilities

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SALT LAKE CITY CORPORATION
Salt Lake City, Utah

PROJECT MANUAL

FOR

SLCPU WEST CAMPUS (TENANT IMPROVEMENT)

PROJECT NO. 512102522

PREPARED BY

DEPARTMENT OF PUBLIC UTILITIES
ENGINEERING DIVISION
1530 S. West Temple
SALT LAKE CITY, UTAH 84115

Project Engineer: **Kelly Jones**
Designer: **Andy Tongish, AIA**
alt architecture

2019

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SEALS PAGE
SLCPU WEST CAMPUS (TENANT IMPROVEMENT)
Project No. 512102522

PROJECT MANUAL PREPARED UNDER THE DIRECTION OF:

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ELECTRICAL

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Company: Rocky Mountain Consulting Engineers

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Phone Number: 801-566-0503



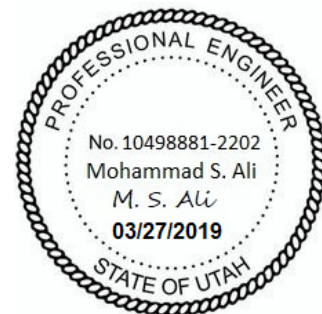
MECHANICAL

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END OF DOCUMENT

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SLCPU WEST CAMPUS (TENANT IMPROVEMENT)
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See G002 for list of drawings

REFERENCE DRAWINGS

1. Manual of Standard Plans published by the Utah Chapter of the American Public Works Association.

END OF DOCUMENT

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DOCUMENT 00 11 16
INVITATION TO BID

PART 1 GENERAL

1.1 CONSTRUCTION CONTRACT

A. Bidders are invited to bid on the Construction Contract named and numbered as:

SLCPU WEST CAMPUS (TENANT IMPROVEMENT)

1805 West 500 South, Salt Lake City

Project No. 512102522

B. For information about the award of this Construction Contract, contact Jason Brown, P.E., Engineering Administrator at 801-483-6888.

C. For information about technical requirements, contact Andy Tongish at 801-865-0633.

1.2 DESCRIPTION OF WORK

A. The location of the work is:

1805 West 500 South, Salt Lake City

B. The work to be performed consists of furnishing and installing the equipment, facilities, services, and appurtenances indicated in the Contract Documents. The Work generally includes, but is not limited to, the following:

Demolition, construction of offices, finishes, mechanical, and electrical work

1.3 BIDDERS' PRE-QUALIFICATION

A. Bidders are not required to be pre-qualified for the Work.

1.4 BASIS OF BIDS

A. Bids shall be on a lump sum basis. Unsealed or segregated Bids will not be accepted.

1.5 CONTRACT TIME

A. The Work will be Substantially Complete within a time period to be specified by the Bidder. Calendar days for winter shut down are to be included.

1.6 EXAMINATION AND PROCUREMENT OF DOCUMENTS

A. Complete sets of Contract Documents may be examined and obtained from the ENGINEER at 1530 South West Temple, Salt Lake City, Utah 84115 or downloaded from SciQuest at the following web address:

<https://solutions.sciquest.com/apps/Router/SupplierLogin?CustOrg=StateOfUtah>.

A non-refundable deposit of **\$10** will be required for each complete set of hard copy plans. The deposit must be a cashier's or company check payable to Salt Lake City Corporation. Major credit cards are also acceptable. CDs containing the Contract Documents will be provided at no cost.

B. To ensure notification of addenda is received, BIDDERS should register as a plan holder on **SCIQUEST**.

1.7 PRE-BID CONFERENCE

- A. A pre-bid conference will be held **on April 18, 2019 at 9:00 am**, at 1530 S. West Temple, Suite 101, Salt Lake City, Utah. All contractors intending to submit a bid are invited to attend to obtain relevant information concerning the project. Bidders are advised that information affecting drawings, specifications, conditions, scope of the Work, etc. may be discussed. OWNER assumes no obligation to disclose information discussed at the pre-bid conference to Bidders who do not attend. Absent Bidders assume all risk of failure to attend.

1.8 BID SECURITY

- A. Bid security amount must equal 5 percent of the total amount of the Bid. A photocopy or facsimile transmission of bid security will not be accepted. Bid Security will be returned to each unsuccessful Bidder after tabulation and award of the Construction Contract.

1.9 BID LOCATION AND OPENING

- A. Sealed bids will be received at the **office of the Salt Lake City Department of Public Utilities at the Engineering office, Room 101**, Leroy W. Hooton Jr. Public Utilities Administration Building, 1530 South West Temple, Salt Lake City, Utah 84115 between 1:30 p.m. and 2:00 p.m., local prevailing time, as conclusively established by the clock at the Bid opening location, on Friday **April 26, 2019**. **Bids delivered to any other location will not be accepted.** Bids received after 2:00 p.m. will not be accepted. Bids will be publicly opened and read in the Main Conference Room, Leroy W. Hooton Jr. Public Utilities Administration Building, 1530 South West Temple, Salt Lake City, Utah 84115 at about 2:00 p.m., local prevailing time, on **Friday, April 26, 2019**, by the Engineering Contracts Coordinator or Public Utilities representative.
- B. On the outside of the envelope, Bidder shall indicate the nature of the bid and include Bidder's return mailing address.

1.10 RIGHT TO REJECT BIDS

- A. OWNER reserves the right to reject any or all bids or to waive any informality or technicality in any bid if OWNER deems it to be in its best interest.

1.11 VALIDITY PERIOD FOR BIDS

- A. Bids shall remain valid for 45 days after the day of Bid opening. A Bidder who receives a Notice of Intent to Award and who withdraws his bid after Bid opening, but before expiration of said period, shall forfeit his bid security.

1.12 GOVERNING LAWS AND REGULATIONS

- A. This project does not require the payment of specific wage rates. Payroll submittals may be required.
- B. Bidders on this Work will be subject to the applicable provisions of all federal rules, laws, and regulations or orders.

1.13 AMERICANS WITH DISABILITIES (ADA)

- A. In compliance with Americans with Disabilities Act (ADA), the following information is provided: FAX Number 801-535-6093, TDD Number 801-535-6219, Contact person: Jesse Stewart, Deputy Director Public Utilities. If assistance is required, please contact the above office at least 72 hours before the bid opening.

1.14 REPRESENTATION REGARDING ETHICAL STANDARDS FOR CITY OFFICERS AND EMPLOYEES AND FORMER CITY OFFICERS AND EMPLOYEES

A. A bid will not be accepted unless it contains the following representation.

THE BIDDER, OFFEROR OR CONTRACTOR represents that it has not:

- 1. Provided an illegal gift or payoff to a City officer or employee or former City officer or employee, or its relative or business entity.**
- 2. Retained any person to solicit or secure this contract upon an agreement or understanding for a commission, percentage, or brokerage or contingent fee, other than bona fide employees or bona fide commercial selling agencies for the purpose of securing business.**
- 3. Knowingly breached any of the ethical standards set forth in the City's conflict of interest ordinance, Chapter 2.44, Salt Lake City Code; or**
- 4. Knowingly influenced, and hereby promises that it will not knowingly influence, a City officer or employee or former City officer or employee to breach any of the ethical standards set forth in the City's conflict of interest ordinance, Chapter 2.44, Salt Lake City Code.**

1.15 AWARD

A. The Construction Contract will be awarded in compliance with the City's Building Improvement and Public Works Bidding Program which takes into account certain factors in the Bidder's work environment (See Salt Lake City Code Section 3.24.115) (See Document 00 22 16, Article 1.2, paragraph "A" for a link to the City Code).

First Publication Date: April 12, 2019

END OF DOCUMENT

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DOCUMENT 00 21 13 INSTRUCTIONS TO BIDDERS

PART 1 GENERAL

1.1 DEFINED TERMS

- A. Terms used in the Bid Documents that are defined in Article 1.1 of the General Conditions will have the meanings indicated in the General Conditions.
- B. General Conditions: as published in Document 00 72 00 in the 2012 edition of the Manual of Standard Specifications by the Utah Chapter of the American Public Works Association.

1.2 COPIES OF BID DOCUMENTS

- A. Complete sets of Bid Documents must be used in preparing Bids. OWNER and ENGINEER assume no responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bid Documents.
- B. Bid Documents are made available to Bidder only for the purpose of obtaining Bids on the Work. No license or grant for any other use is given.
- C. Bidding Document copyrights shall remain with OWNER.
- D. All provisions of the 2012 edition of the Manual of Standard Specifications and Manual of Standard Plans published by the Utah Chapter of the American Public Works Association that are applicable to the Work are made a part of the Contract Documents by reference. Those publications are available on the web at <http://utah.apwa.net>.
- E. Salt Lake City Department of Public Utilities has a document entitled "Standard Practices for Salt Lake City Public Utilities". (January 5, 2010 edition) The document is available from 1530 South West Temple, Salt Lake City, Utah.

1.3 PRE-BID CONFERENCE

- A. Representatives of OWNER and ENGINEER will be present at a pre-bid conference to discuss the Project. Bidders are encouraged to attend and participate in the conference. ENGINEER will transmit to all persons or agencies who have signed up to receive copies of the Bid Documents such Addenda as ENGINEER considers necessary in response to questions arising at the conference. The location and time of the conference are identified in the Invitation to Bid (Document 00 11 16).

1.4 EXAMINATION OF SITE AND CONTRACT DOCUMENTS

- A. **In General:** Bidders are permitted to converse with ENGINEER or ENGINEER's personnel having knowledge of the Project, Plans, Specifications, material sites, or conditions generally prevailing in the area of the Project to aid in pre-bid investigations. OWNER is not bound by any statements or representations made by ENGINEER or ENGINEER's personnel before the Bid opening or award of the Construction Contract, nor for any assumptions or conclusions reached by a prospective Bidder as a result of such communication unless ENGINEER issues an Addendum to all prospective Bidders.
- B. **Access to Site:** The lands upon which the Work is to be performed, and rights-of-way and easements for access thereto and other lands designated for use by Bidder in performing the Work are identified in the Contract Documents. All additional off-site lands and access

thereto required for temporary construction facilities or storage of materials and equipment must be provided by Bidder.

- C. **Contract Documents:** The submission of a Bid will constitute an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article 1.4; that without exception the Bid is premised upon performing and furnishing the Work required by the Contract Documents; and that the Contract Documents are sufficient in scope and detail to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.
- D. **Bidder's Obligations:** The submission of a Bid constitutes acknowledgement that Bidder has complied with all bidding instructions. It is the responsibility of each Bidder, before submitting a Bid, to:
 - 1. Examine the Contract Documents thoroughly;
 - 2. Visit the site to become familiar with local conditions that may affect cost, progress, performance, or furnishing of the Work;
 - 3. Consider federal, state, and local Laws and Regulations that may affect cost, progress, performance, or furnishing of the Work;
 - 4. Study and carefully correlate Bidder's observations with the Contract Documents; and
 - 5. Identify and notify ENGINEER in writing of all specific conflicts, errors, or discrepancies in the Contract Documents, and of any doubts of Bidder about their meanings. The failure or omission of any Bidder to receive or examine any form, instrument, Addendum, or other document, visit the site and become acquainted with conditions there existing, or attend the pre-bid conference, shall in no way relieve any Bidder from obligations with respect to Bidder's Bid or to the Construction Contract.
- E. **Deviations from the Terms of the Contract Documents:** OWNER will not accept any deviations whatsoever from the printed terms of the Agreement (Document 00 52 00) and the Contract Documents, except by Addendum or Change Order.

1.5 PHYSICAL CONDITIONS

- A. **In General:** Before submitting a Bid, each Bidder is responsible for review of OWNER's explorations, tests, and data concerning surface conditions, subsurface conditions, and Underground Facilities at or contiguous to the site, or otherwise, that may affect cost, progress, performance, or furnishing of the Work in accordance with the time, price, and other terms and conditions of the Contract Documents.
- B. **Surface and Subsurface Conditions:** Provisions concerning surface and subsurface conditions, if any, are set forth in the Geotechnical Data (Document 00 31 32). That document provides the identification of:
 - 1. Those reports of explorations and tests of subsurface conditions at the site that have been utilized by ENGINEER in preparing the Contract Documents; and
 - 2. Those drawings of physical conditions in or relating to existing surface and subsurface structures (except Underground Facilities) at or contiguous to the site that have been utilized by ENGINEER in preparing the Contract Documents.
- C. **Underground Facilities:** Information and data indicated in the Contract Documents regarding Underground Facilities at or contiguous to the site is based upon information and

data furnished to OWNER and ENGINEER by owners of such Underground Facilities. OWNER does not assume responsibility for the accuracy or completeness thereof other than as provided in paragraph 4.3A.2 of the General Conditions or unless expressly provided in the Modifications to the General Conditions (Document 00 73 10).

- D. **Additional Explorations:** On request in advance, and if possible, OWNER will provide to each Bidder access to the site to conduct any explorations and tests as each Bidder deems necessary for submission of a Bid. Bidder shall obtain permits, fill all holes, and clean up and restore the site to its former condition upon completion of such explorations. Bidder shall indemnify and save OWNER harmless during and after the performance of additional explorations.
- E. **Modifications to the Contract Documents:** Provisions concerning the adequacy of the data furnished for subsurface structures and underground facilities and the possibility of changes in the documents due to differing conditions appear in Articles 4.2 and 4.3 of the General Conditions.

PART 2 BIDDING PROCEDURES

2.1 INTERPRETATIONS AND ADDENDA

- A. All requests for interpretation of the Contract Documents shall be made in writing and delivered to ENGINEER no later than 72 hours before the Bid opening. If required, ENGINEER will send a written interpretation to all persons receiving a set of Bid Documents in the form of a written Addendum. If a Bidder's request for interpretation is not responded to by ENGINEER, Bidder shall not rely on any interpretation in the request that is contrary to the intent and terms of the Contract Documents.
- B. OWNER will not be responsible for any explanations or interpretations, except those duly issued in the form of written Addenda.
- C. Addenda may also be issued to modify the Bidding Documents as deemed advisable by ENGINEER.
- D. Any Addenda so issued during the time of bidding shall be deemed to be included in the Bid. All Addenda shall become a part of the Contract Documents.
- E. Except to postpone the Bid opening, no Addenda shall be issued within 48 hours before the Bid opening.

2.2 EQUIPMENT AND MATERIAL OPTIONS BEFORE OPENING

- A. If a Bidder or Supplier wishes to use items of equipment or materials other than those identified in the Contract Documents, said Bidder or Supplier shall submit a written request for approval to ENGINEER at least 10 days before the date set for the Bid opening.
- B. The procedure for submission of any such request shall be as follows: submit 1) two sets of the written request and technical brochures and 2) a statement of variances. The statement of variances must list all features of the proposed substitution that differ from the Contract Documents and must further certify that the substitution has no other variant features. The brochure and information submitted must be clearly marked showing make, model, size, options, and any other features and must include sufficient evidence for ENGINEER to evaluate each feature listed as a variance. If after installing the substituted

product, an unlisted variance is discovered, CONTRACTOR shall immediately replace the product with a specified product at no cost to OWNER.

- C. Any approval of such a request by ENGINEER must be made not later than 48 hours before the Bid opening. ENGINEER's failure to approve by such time shall be deemed a denial of the request.
- D. Any such approval is at the sole discretion of ENGINEER and will be in the form of an Addendum, issued to all Bidders holding Bid Documents, indicating that the additional equipment or materials are approved as equal to those specified for the Project.

2.3 **BID SECURITY**

- A. **Delivery of Bid Security:** Bidders must deliver Bid security, in the form of either a Bid Bond or a cashier's check, to OWNER at the time they deliver their Bid. If Bid Security is not delivered with the Bid, the Bid shall not be read.
- B. **Amount of Bid security:** The Bid security amount must equal 5 percent of the total amount of the Bid. The total amount of the Bid shall be the sum of all items of the Bid, constituting the maximum amount of the possible award to the Bidder.
- C. **Bid Bond:** If a Bid Bond is used, a photocopy or facsimile transmission of the Bond will not be accepted. The Bond shall guarantee that the Bidder, if awarded the Work, will promptly enter into the Construction Contract to perform the Work in the manner required by the Contract Documents.
- D. **Cashier's Check:** If a cashier's check is used, the cashier's check must be made payable to Salt Lake City Corporation. A photocopy or facsimile transmission of the check will not be accepted. Personal or company checks will not be accepted.
- E. **Return of Bid Security:** OWNER will return the Bid security to all Bidders by the earlier of 45 days after the date of the Bid opening and 7 days after the effective date of the Construction Contract. The liability of OWNER in regards to cashier's checks shall be limited only to the return of the checks.
- F. **Default:** If the Bidder fails, within the time limit described in Article 3.6A, to enter into the Construction Contract and to deliver to OWNER a Performance Bond, Payment Bond, or any other Bonds or documents required by the Contract Documents after Notice of Intent to Award by OWNER, the Bidder shall forfeit the amount of the Bid Bond or cashier's check as liquidated damages to OWNER.

2.4 **CONTRACT TIME AND PUNCH LIST TIME**

- A. Provisions concerning Contract Time and Punch List Time are set forth in the Agreement (Document 00 52 00).

2.5 **LIQUIDATED DAMAGES**

- A. Provisions concerning liquidated damages are set forth in the Agreement (Document 00 52 00).

2.6 **BID FORM**

- A. The Bid Form (Document 00 41 00) identifies all forms comprising the Bid Documents. Additional copies may be obtained from ENGINEER.
- B. All names must be typed or printed under or near the signature. The signature must be an original signature.

- C. The Bid must contain an acknowledgment of receipt of all Addenda. The Addenda numbers must be filled in on the Bid Form.
- D. The Bidder's address, telephone number, and facsimile number for communications regarding the Bid must be shown on the first page of the Bid Form.
- E. The Bidder shall make no stipulations or alterations on the Bid forms. The Bidder must use only the Bid Form and Bid Schedules bound in the Contract Documents (unless updated forms are included in an addendum, in which case the Bidder shall use the updated forms).
- F. OWNER may waive any failure to comply with the requirements of this paragraph 2.6 if OWNER determines that such failure (1) is not material to the terms of OWNER's Bid Documents and process and does not render the Bid non-compliant with Laws and Regulations pertaining to bidding, or (2) involves ministerial or minor informalities that are evident from the Bid Documents or that can be waived without prejudice to other Bidders and that do not have a substantial effect on price.

2.7 BID SCHEDULE

- A. Any work or material that is specified in the Contract Documents or that is necessary because of the nature of the Work, but that is not listed separately in the Bid Schedule (Document 00 43 00), shall not be measured or paid for separately. The cost of such work or material shall be considered as included in the Contract Price.
- B. All blanks on the Bid Schedule (Document 00 43 00) must be completed in ink or by typewriter. If applicable, furnish both the unit and the total costs for each item. Numbers shall be stated in figures, and the signature of all persons signing shall be in longhand. Any corrections, alterations or erasures made by the Bidder to the information the Bidder entered on the Bid Schedule shall be initialed in ink by the Bidder. OWNER may waive any failure to comply with the requirements of this paragraph if OWNER determines that such failure (1) is not material to the terms of OWNER's Bid Documents and process and does not render the Bid non-compliant with Laws and Regulations pertaining to bidding, or (2) involves ministerial or minor informalities that are evident from the Bid Documents or that can be waived without prejudice to other Bidders and that do not have a substantial effect on price.

2.8 SUBMISSION OF BIDS

- A. Bids shall be submitted at the time and place indicated in the Invitation to Bid (Document 00 11 16), enclosed in an opaque sealed envelope, and marked with the Project title and the name and address of the Bidder. If the Bid is sent through the mail or other delivery system the sealed envelope must be enclosed in a separate envelope with the notation "BID ENCLOSED" on the face of it. It is the sole responsibility of the Bidder to deliver the Bid before the scheduled time.
- B. Alternate bids, other than those called for in the Bid form, will not be considered.
- C. No oral, telegraphic, telephonic, facsimile, or modified bids will be considered. OWNER will not consider any attempted modification of a Bid written or made on the outside of the envelope containing the Bid.

2.9 MODIFICATIONS AND WITHDRAWAL OF BIDS

- A. At any time before the Bid opening, Bids may be modified or withdrawn if a written notice

of the modification or withdrawal, as the case may be, is signed by Bidder and delivered to the place where Bids are to be submitted.

- B. Within two business days after Bids are opened, any Bidder may file written notice with OWNER that there was a substantial mistake made in the preparation of its Bid. Bidder must thereafter promptly demonstrate Bidder's mistake to the reasonable satisfaction of OWNER. If OWNER agrees, Bidder may withdraw its Bid and the Bid security will be returned to Bidder.

2.10 OPENING OF BIDS

- A. Bids will be opened and read aloud publicly unless obviously non-responsive. An abstract of the amounts of the base schedule of prices and any alternate schedules will be made available for review after the opening of Bids.
- B. Any Bids received after the time specified in the Invitation to Bid (Document 00 11 16) will be returned unopened.

2.11 BIDS SUBJECT TO ACCEPTANCE FOR 45 DAYS

- A. Subject to Paragraph 2.3E hereof, Bids remain subject to acceptance for 45 days after the day of the Bid opening. OWNER may, in its sole discretion, release any Bid and return the Bid security before that date. OWNER and Bidder may agree to extend the 45-day deadline.

2.12 NONDISCRIMINATION IN EMPLOYMENT

- A. Work under this Bid will obligate the Bidder and Subcontractors not to discriminate in employment practices.
- B. Bidders must, if requested, submit a compliance report concerning employment practices and policies in order to maintain their eligibility to receive the award of the Construction Contract.
- C. Equal opportunity employment shall be reflected in the racial and sexual composition of Bidder's work force and OWNER urges an affirmative action program to overcome under-utilization.
- D. Bidders are advised that the Construction Contract and its performance are subject to the applicable provisions of all Laws and Regulations. Bidder will be obligated, upon written request, to give all applicable assurances of compliance in connection therewith.
- E. If federal nondiscrimination requirements are applicable, Bidder must be fully knowledgeable and comply with such requirements. Refer to Community Development Block Grant Supplementary Conditions (CDBG) (Document 00 73 12) or Federal Aviation Administration Supplementary Conditions as applicable.

2.13 SECTION 3, HOUSING AND URBAN DEVELOPMENT ACT OF 1968

- A. If Work under this Bid is funded with a federal community development block grant the requirements of Section 3 of the Housing and Urban Development Act of 1968 may apply to the Bidder and its Subcontractors. OWNER encourages the use of the State of Utah Section 3 register for all subcontracting http://housing.utah.gov/section3/HUD_Section_3.html.
- B. Bidder will be obligated to give all applicable assurances of compliance in connection with this Section 2.13 at any time.

PART 3 AWARD OF CONSTRUCTION CONTRACT

3.1 QUALIFICATIONS OF BIDDERS

- A. Within 7 calendar days after ENGINEER's request, a Bidder whose Bid is under consideration for award shall submit to ENGINEER any of the following information requested by ENGINEER. ENGINEER may request like information regarding Bidder's Subcontractors or Bidder's Suppliers.
1. A current financial statement for the Work (as provided to the bonding company);
 2. A chronological list of "completed" construction work done by Bidder during the last 3 years, including project name, address, owner, contract name, and current telephone number;
 3. Work Under Contract Report (Document 00 43 37);
 4. The proposed organizational structure for the project: firm ownership, project manager, progress scheduler, and CONTRACTOR's Resident Superintendent's resume;
 5. Owned and rented equipment that is to be used to do the Work;
 6. Investigations, arbitrations, litigation, or claims that are pending, threatened, settled, or disposed of within the last 3 years;
 7. Evidence of ability to perform and complete the Work in a manner and within the time limit specified. As a minimum, identify specific projects similar to the Work in physical size, cost, and commercial nature. If the work experiences of the project manager and Resident Superintendent designated to construct this project are different than that of Bidder, provide resumes of their work history. Include their actual project titles and indicate their actual responsibilities on each given project;
 8. Names of three (3) projects of similar size and nature that the Resident Superintendent has completed. Include the name, address, and telephone number of the office contracting for each project.
 9. Information so OWNER's Labor Relations Specialist can certify that Bidder has an acceptable Utilization Plan that offers economic opportunities to low and very low income persons and that Bidder qualifies as a Section 3 Contractor; and
 10. Such other data as may be called for in the Supplementary Instructions to Bidders (Document 00 22 13) (if any).
- B. OWNER will hold all requested information confidential and, upon request, shall return such information to Bidder after acceptance or rejection of Bidder's Bid.
- C. Untimely response by Bidder will release OWNER of any obligation to further negotiate or consider Bidder's Bid.

3.2 EVALUATION OF BIDS

- A. OWNER reserves the right: (1) to reject any and all Bids; (2) to waive minor informalities in the Bid Schedule and elsewhere so long as the informalities (a) are not material to OWNER's Bid Documents and process and do not render the Bid non-compliant with Laws and Regulation pertaining to bidding, or (b) involve ministerial or minor informalities that are evident from the Bid Documents or that can be waived without prejudice to other

Bidders and that do not have a substantial effect on price; (3) to negotiate and agree to contract terms with the successful Bidder; and (4) to disregard non-conforming, non-responsive, unbalanced, or conditional Bids.

- B. OWNER reserves the right to reject any Bid if OWNER believes that it would not be in the best interest of the Project or OWNER to make an award to that Bidder. Such rejection may be because the Bid is non-responsive, or Bidder is unqualified or of doubtful ability, or Bidder's Resident Superintendent is unqualified or of doubtful ability, or the Bid or Bidder fails to meet any other pertinent standard or criteria established by OWNER in the Supplementary Instructions to Bidders (Document 00 22 13).
- C. OWNER will consider the qualifications of Bidder and such alternates, prices, and other data as may be requested in the Bid Form (Document 00 41 00), Bid Schedule (Document 00 43 00), or written requests issued prior to OWNER's Notice of Intent to Award the Construction Contract. OWNER will consider Bidder's compliance with Section 3.24.115, Salt Lake City Code. See Document 00 22 16 Supplementary Instructions to Bidders.
- D. OWNER may consider the qualifications and experience of Subcontractors, Suppliers, and other persons and organizations proposed for portions of the Work as provided in the Proposed Subcontractor Form (Document 00 43 36). OWNER will consider Bidder's compliance with Section 3.24.115, Salt Lake City Code. See Document 00 22 16 Supplementary Instructions to Bidders.
- E. OWNER may consider the operating costs, maintenance requirements, performance data, and guarantees of materials and equipment when such data is required to be submitted prior to the Notice of Intent to Award the Construction Contract.
- F. To establish qualifications of Bidder, OWNER may request such data indicated in Article 3.1 hereinabove and conduct such investigations as OWNER deems appropriate.
- G. If the Construction Contract is to be awarded, it will be awarded to the most responsive and lowest, qualified, responsible Bidder as determined by OWNER. Alternates may be accepted depending upon availability of OWNER funds. Bid alternates will be considered in determining the most responsive, lowest, qualified, and responsible Bidder.
- H. OWNER will evaluate Bid Schedules as follows:
 - 1. OWNER will resolve discrepancies in the multiplication of quantities of Work items and unit prices in favor of the unit prices.
 - 2. Prices written out in words shall govern over prices written out in numbers.
 - 3. OWNER will resolve discrepancies between the indicated sum of any column of figures and the correct sum thereof in favor of the correct sum.
 - 4. Bids shall not contain any recapitulations of or changes in the work to be done.
 - 5. OWNER may accept a Bid despite obvious errors in a Bid Schedule, such as a failure to include unit prices or a misplaced decimal point, as long as OWNER reasonably can discern the intention of Bidder as to the amounts to be bid.

3.3 SUBCONTRACTORS, SUPPLIERS AND OTHERS

- A. Bidder shall not subcontract more than 75 percent of the dollar value of the total contemplated Work (exclusive of the supply of materials and equipment to be incorporated in the Work) without OWNER's written approval.

- B. Conflict of interest restrictions pertaining to Subcontractors are described in paragraph 6.5H of the General Conditions.

3.4 **CONTRACT SECURITY AND OTHER SUBMITTALS**

- A. **Performance Bond (Document 00 61 13) and Payment Bond (Document 00 61 14):** OWNER's requirements as to Performance and Payment Bonds are as set forth in the Modifications to General Conditions (Document 00 73 10). Specific requirements are set forth in the Performance Bond (Document 00 61 13) and the Payment Bond (Document 00 61 14).
 - 1. Bidder should carefully examine the form of the Bonds.
 - 2. When the successful Bidder delivers the executed Construction Contract to OWNER, it must be accompanied by the required Performance and Payment Bonds (using Documents 00 61 13 and 00 61 14, respectively).
- B. **Proposed Subcontractor Form (Document 00 43 36):** Bidder must provide this report form to OWNER within 24 hours after ENGINEER's request. See Bid Form, paragraph 1.5B (Document 00 41 00) for additional information. The form shall list the name and address of each Subcontractor who will perform work or labor or render service to Bidder at the site of the Work, or a Subcontractor who, off the job site, will specially fabricate a portion of the Work or improvement according to detail Drawings. In each instance, the nature and extent of any Work to be subcontracted in an amount in excess of 2 percent of the Bid sum shall be described. Bidder must have the written consent of OWNER to substitute for any of the Subcontractors or Suppliers designated or to employ any Subcontractor or Supplier that is not listed.
- C. **Bidder Status Report (Document 00 43 38):** Bidder must submit the completed form upon ENGINEER's request or after Bidder receives the Notice of Intent to Award.
- D. **Other Information:** When a determination has been made to award the Construction Contract, Bidder is required, before the award or after the award, or both, to furnish such other information as ENGINEER requests.

3.5 **ADJUSTMENTS TO THE COST OF THE WORK AFTER OPENING OF BIDS**

- A. The Contract Price identified in the Agreement (Document 00 52 00) represents the Cost of the Work that is to be paid by OWNER to CONTRACTOR. Adjustments to the Contract Price that are agreed to between OWNER and the successful Bidder shall be effected by signing an Agreement Supplement.

3.6 **SIGNING OF AGREEMENT**

- A. Within 10 days, (or such longer period of time that OWNER in its discretion may allow) after OWNER gives Notice of Intent to Award the Construction Contract to the successful Bidder, Bidder shall pick up, sign, and return the required number of copies of the Agreement (Document 00 52 00) and attached documents to OWNER with the required Bonds. A minimum of 3 originals will be signed. One executed original will be returned to Bidder.
- B. Transfers, delegations, or assignments of interests in the Contract Documents are prohibited, unless prior written authorization is received from OWNER.

- C. At and from the time of Bidding through the completion of the Work, Bidder shall be properly licensed to do the Work and shall be in compliance with the license laws of the State of Utah, Salt Lake City and Salt Lake County.

PART 4 MISCELLANEOUS

4.1 EQUIPMENT AND MATERIAL OPTIONS AFTER BID OPENING

- A. The Construction Contract, if awarded, will be on the basis of materials and equipment described in the Drawings, Specifications, and any Addenda.
- B. The procedure for submitting an application for substitution after the effective date of the Construction Contract is set forth in Article 6.4 of the General Conditions.

END OF DOCUMENT

DOCUMENT 00 22 13
SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

Add the following paragraph to Article 3.3.

3.3 SUBCONTRACTOR, SUPPLIERS AND OTHERS

C. The following firms, that have been under contract to the OWNER in the design phase of the Work, shall not be used as subcontractors by the CONTRACTOR.

1. Design Consultant: alt architecture.

Add the following article to Part 4.

4.2 PARTNERING

- A. Refer to Section 01 31 20 for description of partnering requirements.
- B. OWNER's consultants listed in this project manual will be partners to the project.

END OF DOCUMENT

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DOCUMENT 00 22 16
SUPPLEMENTARY INSTRUCTIONS
(Building Improvement and Public Works Project)

PART 1 GENERAL

1.1 INTRODUCTION

- A. OWNER has determined that in accordance with Section 3.24.115 of the Salt Lake City Code the health, safety, and general welfare of the citizens of Salt Lake City is reasonably furthered by OWNER's Building Improvement and Public Works bidding program (BIPW Program).

1.2 BIPW PROGRAM

- A. The BIPW program is set forth in Salt Lake City Code Section 3.24.115 and can be found at the following web address: www.slcinfobase.com. Click on Municipal Ordinances (City Code/Sterling), click on Title 3 – Revenue and Finance, click on Chapter 3.24, click on Article III – Source Selection, click on 3.24.115 Building Improvement or Public Works Projects, click on “Go to new ordinance”.
- B. Bidder shall submit with its bid the information shown on the Qualified Health Insurance Certification Form (Document 00 43 45). In that form Bidder certifies that the information given is true as of the time of submitting its bid. The information will be used in the manner stated in paragraph “F” below to evaluate “responsiveness” if bids are within 10% of each other. That form is used by Bidder to certify that Bidder and all subcontractors of Bidder working on the project have and will maintain an offer of qualified health insurance in compliance with Salt Lake City Code 3.24.115 for the duration of the contract. Neither the failure to submit document 00 43 45 nor checking “No” will render the bid non-responsive.
- C. Bidder shall submit with its bid the information shown on the Work Environment Certification Form (Document 00 43 46). In that form Bidder certifies that the information given is true as of the time of submitting its bid. If “Yes” is not certified for each item, the bid will be rejected as non-responsive. See Section 3.24.115 of the Salt Lake City Code. That form is used by Bidder to certify that Bidder and all subcontractors of Bidder working on the project have and will maintain 1) a drug and alcohol testing policy; 2) a program to recruit and/or employ veterans; 3) a job training program; 4) a safety program; and 5) a formal policy of non-discrimination in compliance with Salt Lake City Code Section 3.24.115 for the duration of the contract
- D. OWNER reserves the right to review or audit any information provided by Bidder to make its evaluation. Bidder shall provide or furnish access to any necessary records or other information in order to permit OWNER to verify Bidder's or and Subcontractor's certifications. Bidder shall provide or furnish access to such records and information no later than 3 business days after OWNER issues a written request for the same.

- E. The BIPW program will only affect bids in excess of \$250,000, as determined by a city engineer's estimate. See 1.3 B of Document 00 41 00 to determine if the City engineer's estimate exceeds \$250,000.00
- F. If more than one Bidder answers "YES" to the question on the Qualified Health Insurance Certification Form (Document 00 43 45), the following analysis will apply: A Bidder who has and will maintain an offer of qualified health insurance coverage under the BIPW program and whose bid is not more than 10 percent higher than the bid of another Bidder who does not have such insurance, will be deemed the more responsive Bidder. If two or more Bidders are judged to be equally responsive, OWNER will make the award to the Bidder with the lowest bid price. For purposes of this paragraph "F", references to "Bidder" with respect to qualified health insurance coverage shall be deemed to refer also to any subcontractors under such Bidder.

1.3 **BIPW PROGRAM**

- A. In situations in which the factors listed in the Qualified Health Insurance Certification form affect the award of the Bid, the winning Bidder will be required to enter into a Qualified Health Insurance Supplemental Agreement (Document 00 54 16) with OWNER.

1.4 **Important information for Bidder and all Subcontractors of the successful Bidder**

- A. Salt Lake City Code Section 3.24.115 paragraph B.3 states the following:
 - 3. A contractor and any subcontractor who does not certify compliance with the factors in Subsection B.1b to B.1f of this subsection shall be deemed non-responsive and shall be disqualified.
- B. Refer to the Bid Form (Document 00 41 00) for the sequence of submittals to ensure compliance with Salt Lake City Code Section 3.24.115.

END OF DOCUMENT

DOCUMENT 00 22 18
SUPPLEMENTARY INSTRUCTIONS (VP)

NOT USED

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DOCUMENT 00 41 00
BID FORM

PART 1 GENERAL

1.1 BIDDER

- A. Name: _____
- B. Address: _____

- C. Telephone number: _____
- D. Email address: _____
- E. Facsimile number: _____
- F. Tax identification number: _____
- G. Bidder holds license number _____, issued by the Utah State Department of Commerce, Division of Occupational and Professional Licensing. Bidder is licensed to practice as a _____ Contractor. The license expiration date _____.

1.2 NOTICE

- A. Pursuant to Section 58-55-501(8), Utah Code Annotated (UCA), it is unlawful to submit a bid for any work for which a license is required under Chapter 55 of Title 58, UCA, by a person or other business entity not licensed or excepted from licensure as a contractor under Chapter 55 of Title 58, UCA. Pursuant to Section 58-55-503(1), UCA, contracts for the work may not be awarded to any person or other business entity that violates Sections 58-55-501(8) UCA, in submitting its Bid.

1.3 CONSTRUCTION CONTRACT

- A. SLCPU WEST CAMPUS (TENANT IMPROVEMENT), Project No. 512102522
- B. The city engineer's estimate for this project is over \$250,000.00.
- C. This project is not CDBG funded.
- D. This project does not require a permit to work in the Public Way from Salt Lake City Engineering, 349 South 200 East, Suite 100. If such a permit is required, Section 6.7 (H) (1) (d) of Document 00 73 10 (Modifications to the General Conditions) shall apply.

1.4 ADDENDA

- A. Bidder hereby acknowledges receipt of the following Addenda.

(list Addenda numbers here)

1.5 SUBMITTALS

A. **With Bid:**

1. This Bid Form (Document 00 41 00).
2. Bid Schedule (Document 00 43 00).
3. Bid bond.
4. Voluntary Submittals: (If the documents noted below are included in the Project Manual).
 - a. Economic Opportunities Form (Document 00 43 41 – CDBG Projects only). Bidder may be at a competitive disadvantage if it does not submit the Economic Opportunities Form.
 - b. Value Program Form (Document 00 43 40) Bidder may be at a competitive disadvantage if it does not submit the Value Program Form.
5. Mandatory Submittals (If the documents noted below are included in the Project Manual).
 - a. Qualified Health Insurance Certification Form (Document 00 43 45), checking “No” will not render the bid non-responsive. That form is used by Bidder to certify whether Bidder and all subcontractors of Bidder working on the project have and will maintain an offer of qualified health insurance in compliance with Salt Lake City Code Section 3.24.115 for the duration of the contract.
 - b. Work Environment Certification Form (Document 00 43 46) If the Bidder does not certify yes to each question in Document 00 43 46 the bid will be rejected as non-responsive. That form is used by Bidder to certify that Bidder and all subcontractors of Bidder working on the project have and will maintain 1) a drug and alcohol testing policy; 2) a program to recruit and/or employ veterans; 3) a job training program; 4) a safety program; and 5) a formal policy of non-discrimination in compliance with Salt Lake City Code Section 3.24.115 for the duration of the contract. See Section 3.24.115 of the Salt Lake City Code and Article 1.4 of Section 00 22 16 Supplemental Instructions.

B. Due diligence letter to Bidder: If Bidder receives a due diligence letter from OWNER after bid opening, Bidder must submit the following documents to OWNER after ENGINEER’s request.

1. Document 00 43 36: Proposed Subcontractor Form.
2. Document 00 43 37: Work Under Contract Report.
3. Document 00 43 38: Bidder Status Report.
4. Other information requested and as defined in Article 3.1 and 3.4 D of Document 00 21 13.

C. **After Notice of Intent to Award:** If Bidder receives a notice of intent to award the Contract from OWNER after bid opening, Bidder must submit the following documents to OWNER.

1. Document 00 52 00: Agreement.
2. Document 00 61 13: Performance Bond.

3. Document 00 61 14: Payment Bond.
4. Document 00 62 16: Applicable Insurance Certificate.
5. Supplementary Submittals (if applicable):
 - a. Copy of letter from OWNER's Labor Relations Specialist certifying that Bidder has an approved utilization plan that offers economic opportunities to low and very low income persons.
 - b. Document 00 54 00: Agreement Supplement.
 - c. Document 00 54 15 Value Program Supplemental Agreement.
 - d. Document 00 54 16: Qualified Health Insurance Supplemental Agreement.
 - e. Document 00 54 17: Economic Opportunities Supplemental Agreement.

1.6 DEFINITIONS

- A. **Bid Documents:** The Bid Documents consist of the Invitation to Bid, the Instructions to Bidders, any Supplementary Instructions to Bidders, this Bid form, any supplements (or post-bid supplements), the Bid Schedule, any data listed by and limited to the provisions in the Geotechnical Data Document, and the Bid Bond.
- B. **Bid Bond:** AIA Document A310 as published by the American Institute of Architects, 1736 N. Y. Ave. N. W. Washington, D.C. 20006 or one substantially the same and acceptable to OWNER.
- C. **HUD:** United States Department of Housing and Urban Development.

PART 2 COVENANTS

2.1 BIDDER TO ENTER INTO AN AGREEMENT

- A. **In General:** Bidder agrees, if this Bid is accepted, to enter into a Construction Contract with OWNER to perform and furnish all Work specified or indicated in the Contract Documents at the Contract Time and Contract Price identified in the Agreement (Document 00 52 00).
- B. **Agreement Supplement:** If it becomes necessary to further define the Work, Contract Price, Contract Time, or some other portion of the Construction Contract before signing the Agreement (Document 00 52 00), ENGINEER shall prepare an Agreement Supplement (Document 00 54 00) describing such change. OWNER shall have sole discretion in determining the necessity of preparing such a contract modification. If the Agreement Supplement is acceptable to Bidder, Bidder shall execute the Agreement Supplement before or concurrently with the execution of the Agreement (Document 00 52 00).
- C. If Bidder was awarded the Construction Contract in part as a result of OWNER's Value-Based Procurement Program, Bidder shall enter into a Value Program Supplemental Agreement (Document 00 54 15) with OWNER concurrently with its execution of the Agreement (Document 00 52 00).

- D. If Bidder was awarded the Construction Contract in part as a result of OWNER's Qualified Health Insurance program, Bidder shall enter into a Qualified Health Insurance Supplemental Agreement (Document 00 54 16) with OWNER concurrently with its execution of the Agreement (Document 00 52 00).

2.2 **BIDDER ACCEPTS TERMS AND CONDITIONS**

- A. Bidder accepts all of the terms and conditions of the Bid Documents, including without limitation those dealing with the disposition of Bid security.
- B. Bidder must pick up, sign, and submit, the required number of copies of the Agreement (Document 00 52 00) with the Bonds and other documents required by the Agreement within 10 days (or such longer period of time that OWNER in its discretion may allow) after the date of OWNER's Notice of Intent to Award the Construction Contract.

2.3 **REPRESENTATION OF BIDDER**

- A. In submitting this Bid, Bidder represents, as more fully set forth in the Instructions To Bidders (Document 00 21 13), that:
 - 1. **Nature of the Work:** Bidder has become familiar with the nature and extent of the Contract Documents, Work, site, locality, and all local conditions and Laws and Regulations that in any manner may affect cost, progress, performance, or furnishing of the Work.
 - 2. **Surface and Subsurface Conditions:** Bidder has studied carefully all reports and drawings of subsurface conditions and drawings of physical conditions that are identified in the Geotechnical Data (Document 00 31 32) (if any).
 - 3. **Underground Utilities:** Bidder has reviewed and checked all information and data shown or indicated on the Contract Documents with respect to existing Underground Facilities at or contiguous to the site.
 - 4. **Bidder Investigation:** Bidder has correlated the results of all observations, examinations, investigations, explorations, tests, reports, and studies with the terms and conditions of the Contract Documents.
 - 5. **Discrepancy Resolutions:** Bidder has given ENGINEER written notice of all conflicts, errors, or discrepancies that Bidder has discovered in the Contract Documents and acknowledges that all written resolutions thereof issued by ENGINEER before Bid opening, are acceptable to Bidder.

2.4 **OWNER'S RIGHTS AT BID AWARD**

- A. Bidder agrees that OWNER has the right to reject this Bid or to award the Work or any part thereof to the undersigned at the prices stipulated. Bidder agrees to make no claim for damages for such rejection or award.
- B. If the Bid is rejected, then the Bid security shall be returned to Bidder.
- C. If the Bid is accepted, OWNER shall notify Bidder of OWNER's intent to award the Construction Contract to Bidder. Bidder shall have 10 days (or such longer period of time that OWNER in its discretion may allow) to sign and return the Agreement (Document 00 52 00) to ENGINEER. If Bidder fails to sign the Agreement, the Bid security, at OWNER's option, shall be claimed and cashed and the amount thereof paid to

OWNER as liquidated damages for the failure of Bidder to comply with the terms of the Bid.

- D. Bidder agrees that the Bid may be rejected if the submittals listed in this Document or the Notice of Intent to Award are not submitted within the time listed in the Notice of Intent to Award (or described in paragraph 2.4C hereof).

2.5 **NON-COLLUSION; ETHICS**

- A. Bidder represents that the Bid is genuine. The Bid is not made in the interest of or on behalf of any undisclosed person, firm, or corporation.
- B. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid.
- C. Bidder has not solicited or induced any person, firm, or corporation to refrain from bidding.
- D. Bidder has not sought by collusion to obtain for itself any other advantage over any separate Bidder or over OWNER.
- E. **REPRESENTATION REGARDING ETHICAL STANDARDS FOR CITY OFFICERS AND EMPLOYEES AND FORMER CITY OFFICERS AND EMPLOYEES**

Bidder represents that it has not:

- 1. Provided an illegal gift or payoff to a City officer or employee or former City officer or employee, or his or her relative or business entity.**
- 2. Retained any person to solicit or secure this contract upon an agreement or understanding for a commission, percentage, or brokerage or contingent fee, other than bona fide employees or bona fide commercial selling agencies for the purpose of securing business.**
- 3. Knowingly breached any of the ethical standards set forth in the City's conflict of interest ordinance, Chapter 2.44, Salt Lake City Code; or**
- 4. Knowingly influenced, and hereby promises that it will not knowingly influence, a City officer or employee or former City officer or employee to breach any of the ethical standards set forth in the City's conflict of interest ordinance, Chapter 2.44, Salt Lake City Code.**

2.6 **BID PRICING**

- A. Bidder will complete the Work for the prices listed in the Bid Schedule (Document 00 43 00). Bidder agrees that quantities for Unit Price Work are not guaranteed. (Refer to Article 11.7 of the General Conditions (Document 00 72 00).

2.7 **SUBSTANTIAL COMPLETION, PROJECT COMPLETION, AND LIQUIDATED DAMAGES**

- A. Bidder agrees that the Work will be Substantially Complete and ready for Final Inspection on or before the expiration of the Contract Time indicated in the Agreement (Document 00 52 00).

- B. Bidder agrees that the Work will be complete and ready for final payment in accordance with Article 14.9 of the General Conditions (Document 00 72 00) on or before the expiration of the Punch List Time indicated in the Agreement.
- C. Bidder accepts the provisions of the Agreement (Document 00 52 00) as to liquidated damages in the event of failure to complete the Work on time and in accordance with the Contract Documents.

PART 3 EXECUTION

3.1 EFFECTIVE DATE

- A. Bidder executes this Bid and declares it to be in effect as of the _____ day of _____ - _____, 20 _____.

3.2 BIDDER'S SUBSCRIPTION

- A. Bidder's Signature: _____
- B. Please print Bidder's name here: _____
- C. Title: _____

END OF DOCUMENT

DOCUMENT 00 43 00
BID SCHEDULE

PART 1 GENERAL

1.1 DOCUMENT INCLUDES

A. Price schedules.

1.2 CONSTRUCTION CONTRACT

A. SLCPU WEST CAMPUS (TENANT IMPROVEMENT)
1811 West 500 South, Salt Lake City
Project No. 512102522

1.3 REFERENCES

A. APWA Section 01 29 00: Payment Procedures.

B. Document 00 52 00: Agreement.

1.4 SCHEDULE TO BE ADDED TO THE AGREEMENT

A. This document will be added to the Agreement by reference.

PART 2 PRICE SCHEDULES

2.1 GENERAL

A. **CAUTION: Bidder shall complete all blanks in the following price schedule.**

B. Number of schedules in Base Bid: One.

C. Number of alternate schedules: None. Alternate Bid schedule awarded if funding is available.

D. Based upon Bidder's own estimate of quantities and costs and in accordance with paragraph 2.5B.3 of the General Conditions (Document 00 72 00), Bidder agrees to submit a preliminary schedule of values of quantities and prices of items aggregating the total bid amount or additional breakdown when ENGINEER is considering Bidder's bid. The schedule of values will serve as the basis for future progress payments.

E. For progress payment procedures, see APWA Section 01 29 00.

2.2 BASE BID

A. The work to be performed consists of furnishing and installing the equipment, facilities, services, and appurtenances indicated in the Contract Documents. The Work generally includes, but is not limited to, the following:

Demolition, construction of offices, finishes, mechanical, and electrical work

B. Lump sum total bid amount is

(in written words)

(\$ _____)

(in numerical figures)

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DOCUMENT 00 43 36
PROPOSED SUBCONTRACTOR FORM

PART 1 GENERAL

1.1 BIDDER

A. Name: _____

Address: _____

B. Telephone Number: _____

1.2 CONSTRUCTION CONTRACT

A. SLCPU WEST CAMPUS (TENANT IMPROVEMENT)

1805 West 500 South, Salt Lake City

Project No. 512102522

PART 2 REPORT

2.1 SUBCONTRACTOR AND SUPPLIER REPORT

- A. Failure of Bidder to specify a Subcontractor for any portion of the Work constitutes an agreement by Bidder that Bidder is fully qualified to perform that portion and that Bidder shall perform that portion. See Instructions to Bidders (Document 00 21 13, paragraph 3.4B for additional information concerning the subcontractors and the nature and extent of any work that must be listed on this form.
- B. Bidder will be fully responsible to OWNER for the acts and omissions of Subcontractors and Suppliers and of persons either directly or indirectly employed by them, as Bidder is for the acts and omissions of persons employed by Bidder directly.
- C. Nothing contained in the Contract Documents shall create any contractual relationship between any Subcontractor or Supplier and OWNER. Bidder agrees that each subcontract with Bidder's Subcontractor will disclaim any third party or direct relationship between OWNER and any Subcontractor or Supplier.
- D. The names and addresses of the Subcontractors and Suppliers who will work under the terms of the Contract Documents and the estimated dollar amount of each subcontract, as appropriate, are set forth in the following tables.

SUBCONTRACTORS		
Name	Nature and Extent of Work to be Subcontracted	Amount
1.		
2.		
3.		
Total \$ _____		
Percent of Total Contract _____%		
SUPPLIERS		
Name	Nature and Extent of Work to be Supplied	Amount
1.		
2.		
3.		
4.		

PART 3 EXECUTION

3.1 EFFECTIVE DATE

- A. Bidder executes this Subcontractor and Supplier report and declares it to be a supplement to the Bid (Document 00 41 00) and in effect as of _____, 20__

3.2 BIDDER'S SUBSCRIPTION

- A. Bidder's signature: _____
- B. Please print Bidder's name here: _____
- C. Title: _____

END OF DOCUMENT

DOCUMENT 00 43 37
WORK UNDER CONTRACT REPORT

PART 1 GENERAL

1.1 BIDDER

A. Name: _____

Address: _____

B. Telephone Number: _____

1.2 CONSTRUCTION CONTRACT

A. SLCPU WEST CAMPUS (TENANT IMPROVEMENT)

1805 West 500 South, Salt Lake City

Project No. 512102522

PART 2 REPORT

2.1 STATUS OF WORK UNDER CONTRACT

A. The completion and submission to OWNER of the following table by Bidder is required within 7 calendar days after ENGINEER's request per Article 3.1 of the Instructions to Bidders (Document 00 21 13). OWNER may declare Bidder non-responsive if this report is not submitted on time.

B. The successful Bidder is required to notify OWNER in writing of any new contracts awarded before the execution of the Construction Contract.

STATUS OF WORK UNDER CONTRACT

	Description of Contract And for Whom Performed	Date of Award	Amount of Contract	Contract Completion Date	Percent Complete	Scheduled Completion Date	Dollar Amount Outstanding
1							
2							
3							
4							

	Description of Contract And for Whom Performed	Date of Award	Amount of Contract	Contract Completion Date	Percent Complete	Scheduled Completion Date	Dollar Amount Outstanding
5							
6							
7							
8							
9							
10							

Total of Dollar Amount Outstanding \$ _____
CONTRACTOR's Bid for this Project \$ _____
TOTAL \$ _____

C. Add supplemental sheets if necessary to account for all work under contract.

PART 3 EXECUTION

3.1 EFFECTIVE DATE

A. Bidder executes this Work Under Contract Report and declares it to be a supplement to the Bid (Document 00 41 00) and in effect as of _____, 20____.

3.2 BIDDER'S SUBSCRIPTION

A. Bidder's signature: _____
B. Please print Bidder's name here: _____
C. Title: _____

END OF DOCUMENT

DOCUMENT 00 43 38
BIDDER STATUS REPORT

PART 1 GENERAL

1.1 BIDDER

A. Name: _____

B. Address: _____

C. Telephone number: _____

1.2 CONSTRUCTION CONTRACT

A. SLCPU WEST CAMPUS (TENANT IMPROVEMENT)

1805 West 500 South, Salt Lake City

Project No. 512102522

PART 2 REPORT

2.1 BIDDER STATUS REPORT

A. Bidder affirms that the following information is true and correct.

1. Number of employees: _____

2. Bidder's firm is: (check all of the following that are applicable)

Independently owned and operated.

An affiliate of*

A subsidiary of*

A division of*

A business with gross revenue in excess of \$ _____

A business with gross revenue below \$ _____

* PARENT COMPANY:

Name: _____

Address: _____

Telephone Number: _____

Facsimile Number: _____

PART 3 EXECUTION

3.1 EFFECTIVE DATE

A. Bidder executes this status report and declares it to be a supplement to the Bid Form (Document 00 41 00) and in effect as of _____, 20 ____.

3.2 BIDDER'S SUBSCRIPTION

A. Bidder's Signature: _____

B. Please print Bidder's name here: _____

C. Title: _____

END OF DOCUMENT

DOCUMENT 00 43 40
VALUE PROGRAM FORM

NOT USED

[This page was intentionally left blank.]

DOCUMENT 00 43 45

QUALIFIED HEALTH INSURANCE CERTIFICATION FORM

PART 1 GENERAL

1.1 BIDDER

A. Name: _____

B. Address: _____

C. Telephone number: _____

1.2 CONSTRUCTION CONTRACT

A. SLCPU WEST CAMPUS (TENANT IMPROVEMENT)

1805 West 500 South, Salt Lake City

Project No. 512102522

1.3 AFFIDAVIT

A. Bidder, on behalf of Bidder and every subcontractor under Bidder, if any, affirms that the following information is true and correct as of the time of submitting its bid.

1. Bidder and every subcontractor, if any, provides and will maintain Qualified Health Insurance Coverage Yes _____ No _____
initial initial

as defined in Section 3.24.115 of the Salt Lake City Code (and as described in (B) below) for the duration of the contract.

B. Qualified Health Insurance Coverage as defined in Section 3.24.115:

1. A health benefit plan (not including dental coverage) and employer contribution level with a combined actuarial value at least actuarially equivalent to the combined actuarial value of the benchmark plan determined by the Children's Health Insurance Program under Utah Code Section 26-40-106(2)(a) and a contribution level of 50% of the premiums for the employee and the dependents of the employee who reside or work in Utah under which:

a. The employer pays at least 50% of the premium for the employee and the dependents of the employee who reside or work in Utah; and

b. For purposes of calculating actuarial equivalency under this provision, rather than the benchmark plan's deductible and the benchmark plan's out-of-pocket maximum based on income levels:

i. The annual deductible is one \$1,000 per individual and \$3,000 per family; and

ii. The annual out-of-pocket maximum is \$3,000 per individual and \$9,000 per family; or

2. A federally qualified high-deductible health plan (not including dental coverage) that at a minimum:
 - a. Has a deductible that is either:
 - i. The lowest deductible permitted for a federally qualified high-deductible plan; or
 - ii. deductible that is higher than the lowest deductible permitted for a federally qualified high-deductible health plan, but includes an employer contribution to a health savings account in a dollar amount at least equal to the dollar amount difference between the lowest deductible permitted for a federally qualified high-deductible plan and the deductible for an employer-offered federal qualified high-deductible plan; and
 - b. Has an out-of-pocket maximum that does not exceed three times the amount of the annual deductible; and
 - c. The employer pays 60% of the premium for the employee and the dependents of the employee who work or reside in Utah.

PART 3 EXECUTION

3.1 EFFECTIVE DATE

- A. Bidder executes this form, a supplement to the Bid Form (Document 00 41 00), and declares it to be true and correct and in effect as of _____, 20 ____.

3.2 BIDDER'S SUBSCRIPTION

- A. Bidder's signature: _____
- B. Please print Bidder's name here: _____
- C. Title: _____

END OF DOCUMENT

DOCUMENT 00 43 46
WORK ENVIRONMENT CERTIFICATION FORM

PART 1 GENERAL

1.1 BIDDER

A. Name: _____

B. Address: _____

C. Telephone number: _____

1.2 CONSTRUCTION CONTRACT

A. SLCPU WEST CAMPUS (TENANT IMPROVEMENT)

1805 West 500 South, Salt Lake City

Project No. 512102522

1.3 AFFIDAVIT

A. Bidder, on behalf of Bidder and every subcontractor under Bidder, if any, affirms that the following information is true and correct.

1. Bidder and every subcontractor, if any, provides and will maintain the following as defined in Section 3.24.115 of the Salt Lake City Code for the duration of the contract.

a.	A drug and alcohol testing policy during the period of the contract.	Yes _____ Initial No _____ Initial
b.	A program to actively recruit and/or employ veterans.	Yes _____ Initial No _____ Initial
c.	A job training program.	Yes _____ Initial No _____ Initial

d.	A safety program.	Yes _____ Initial No _____ Initial
e.	A formal policy of non-discrimination consistent with federal, state, and local law.	Yes _____ Initial No _____ Initial

PART 3 EXECUTION

3.1 EFFECTIVE DATE

A. BIDDER executes this form and declares it to be true and correct and in effect as of _____, 20 ____.

3.2 BIDDER'S SUBSCRIPTION

A. BIDDER's signature: _____

B. Please print BIDDER's name here: _____

C. Title: _____

END OF DOCUMENT

DOCUMENT 00 52 00
AGREEMENT

This Agreement is dated as of the date that the City Recorder attests the applicable City signature, which date shall be the recordation date, and is between Salt Lake City Corporation, a Utah municipal corporation, 1530 S. West Temple, Suite 101, P.O. Box 145506, Salt Lake City, Utah 84114-5506 (OWNER or City) and the following entity (CONTRACTOR)

Name: _____

Address: _____

Telephone number: _____

Facsimile number: _____

For valuable consideration, the receipt of which the parties acknowledge, OWNER and CONTRACTOR agree to the following.

PART 1 GENERAL

1.1 DEFINITIONS

A. Words used in this Agreement, in any Qualified Health Insurance Supplemental Agreement (Document 00 54 16), in any Value Program Supplemental Agreement (Document 00 54 15), and in any Supplemental Agreement (Document 00 54 00) related hereto that are defined in Document 00 72 00 in the 2012 Edition of the Manual of Standard Specifications published by the Utah Chapter of the American Public Works Association shall have meaning as defined therein.

1.2 WORK

A. CONTRACTOR shall provide the construction and services specified in the Drawing and Specifications in the Construction Contract known as:

SLCPU WEST CAMPUS (TENANT IMPROVEMENT)

1805 West 500 South, Salt Lake City

Project No. 512102522

B. CONTRACTOR shall comply with its obligations under the Contract Documents.

1.3 ENGINEER

A. **JASON BROWN, P.E.** is OWNER's representative and agent who has the rights, authority, and duties assigned to ENGINEER in the Contract Documents.

1.4 ASSIGNMENT NOT BINDING WITHOUT WRITTEN CONSENT

- A. No assignment of any right or interest in the Construction Contract shall be made without written consent of OWNER and CONTRACTOR. No assignment will release or discharge OWNER or CONTRACTOR from any duty or responsibility under the Construction Contract unless specifically stated to the contrary in any written consent to an assignment.
- B. CONTRACTOR shall make no assignment of money that is due without OWNER's written consent (except to the extent that the effect of this restriction may be limited by Law or Regulation).

1.5 BINDING TERMS

- A. OWNER and CONTRACTOR each binds itself, its partners, successors, assigns, and legal representatives to the other party hereto, its partners, successors, assigns, and legal representatives in respect to all covenants, agreements, and obligations contained in the Construction Contract.

1.6 REPRESENTATION REGARDING ETHICAL STANDARDS FOR CITY OFFICERS AND EMPLOYEES AND FORMER CITY OFFICERS AND EMPLOYEES

- A. **CONTRACTOR represents that it has not:**
 - 1. **Provided an illegal gift or payoff to a City officer or employee or former City officer or employee, or his or her relative or business entity.**
 - 2. **Retained any person to solicit or secure this contract upon an agreement or understanding for a commission, percentage, or brokerage or contingent fee, other than bona fide employees or bona fide commercial selling agencies for the propose of securing business.**
 - 3. **Knowingly breached any of the ethical standards set forth in City's conflict of interest ordinance, Chapter 2.44, Salt Lake City Code; or**
 - 4. **Knowingly influenced, and hereby promises that it will not knowingly influence, a City officer or employee or former City officer or employee to breach any of the ethical standards set forth in City's conflict of interest ordinance, Chapter 2.44, Salt Lake City Code.**

PART 2 TIME AND MONEY CONSIDERATIONS

2.1 CONTRACT PRICE

- A. The Contract Price includes the cost of the Work specified in the Contract Documents, plus the cost of all bonds, insurance, permits, and fees, and all charges, expenses, and assessments of whatever kind or character.
- B. The Schedules of Prices awarded from the Bid Schedule (Document 00 43 00) are as follows.
 - 1. _____
 - 2. _____

3. _____

4. _____

C. An Agreement Supplement (Document 00 54 00) [___] is, [___] is not attached to this Agreement.

D. A Qualified Health Insurance Supplemental Agreement (Document 00 54 16) [___] is, [___] is not attached to this Agreement.

E. A Value Program Supplemental Agreement (Document 00 54 15) [___] is [___] is not attached to this Agreement.

F. Based upon the above-awarded schedules and the Agreement Supplement (if any), the Contract Price awarded is: _____

_____ dollars and
_____ cents (\$ _____).

2.2 CONTRACT TIME

A. Contract Time shall:

1. Be 90 calendar days after the date of the Notice to Proceed; or

2. Terminate at mid-night of the ___ day of _____, 20 ___.

B. Any time specified in work sequences in the Summary of Work (Section 01 11 00) shall be a part of the Contract Time.

2.3 PUNCH LIST TIME

A. CONTRACTOR shall complete all Work within 14 days after CONTRACTOR receives ENGINEER's Final Inspection Punch List unless ENGINEER grants additional time in writing or an exception has been specified in the Contract Documents.

B. Permitting CONTRACTOR to continue and finish the Work or any part of the Work after the time fixed for its completion, or after the date to which the time for completion may have been extended, whether or not a new completion date is established, shall in no way operate as a waiver on the part of OWNER of any of OWNER's rights.

2.4 LIQUIDATED DAMAGES

A. CONTRACTOR agrees that OWNER will suffer damage or financial loss if the Work is not completed within the Contract Time, if sequenced work is not completed on time, or if public services are interrupted. CONTRACTOR and OWNER agree that the exact amount of damage or loss is difficult to determine.

B. OWNER shall be entitled to deduct and retain liquidated damages out of any money that may be due or become due CONTRACTOR. To the extent liquidated damages exceed any amounts due CONTRACTOR, CONTRACTOR shall be liable for such amounts and shall return such amounts to OWNER.

C. Instead of requiring proof of damage or specific financial loss, CONTRACTOR shall pay the following sums to OWNER as liquidated damages and not as a penalty. Such liquidated damages shall relate only to the additional administrative costs and expenses incurred by OWNER and shall not prevent OWNER from pursuing other remedies or collecting actual damages for damage or loss other than administrative costs and expenses.

1. **Late Completion: Five-hundred and no/100 cents** (\$ 500.00) for each day or part thereof that expires after the Contract Time until the Work is Substantially Complete as provided in Article 14.5 of the General Conditions (Document 00 72 00).
2. **Late Punch List Time Completion:** 50 percent of the amount specified for Late Contract Time Completion for each day or part thereof that the Work remains incomplete after the Punch List Time. The Punch List shall be considered received by CONTRACTOR on the day it is transmitted by facsimile or hand delivery or the day it is received by registered or certified mail.
3. **Work Sequence Completion:** If a Work sequence is specified, then for each day or part thereof that exceeds the specified time and until ENGINEER determines that such Work sequence is Substantially Complete, CONTRACTOR shall pay the following sums to OWNER.
 - a. Work Sequence 1: _____ dollars and _____ cents (\$ _____) per day.
 - b. Work Sequence 2: _____ dollars and _____ cents (\$ _____) per day.
4. **Survey Monuments:** \$1,000.00 if a land survey monument is disturbed or moved and ENGINEER's surveyor has not referenced the survey monument for resetting.
5. **Interruption of Public Services:** No interruption of public services shall be caused by CONTRACTOR, its agents, or employees, without ENGINEER's prior written approval.

2.5 RETAINAGE

- A. **Retainage is at OWNER's Option:** OWNER may, in its sole discretion, retain and withhold up to five percent of any payment due to CONTRACTOR under the Construction Contract, but the total retention may not exceed five percent of the total Contract Price. If, in ENGINEER's opinion, the Work is proceeding in accordance with CONTRACTOR's approved progress schedule, and all progress schedule submittals are current and up to date, and all required payrolls, Shop Drawings, and miscellaneous submittals are current and up to date, OWNER may choose not to withhold retainage.
 1. **Payments:** At any time after 50 percent of the Work has been completed and if \$50,000 or more has been retained, OWNER may make any of the remaining progress payments in full if, in OWNER's sole discretion, the Work is progressing satisfactorily. While CONTRACTOR is carrying on the Work, OWNER may pay monthly the balance not retained as aforesaid, after deducting all previous payments and all sums to be kept or retained under the provisions of the Construction Contract. No such payment shall be required to be made when, in the judgment of ENGINEER, the Work is not proceeding in accordance with the Contract Documents or when in ENGINEER's judgment the total value of the Work done since the last estimate amounts to less than \$300. No such payment shall be construed to be an acceptance of any defective or improper Work or materials.

2. **Reducing the Retainage:** As the Work nears completion and solely at ENGINEER's discretion, OWNER may reduce the retainage to an amount more in line with the Work actually remaining.
- B. **Interest:** Any money retained by OWNER shall be placed in an interest-bearing account held by OWNER as of the date such money would have otherwise been payable. The interest accrued thereon shall be for the benefit of CONTRACTOR.
- C. **Release of Retainage and Interest:** Any retained moneys and any accrued interest thereon shall be released to CONTRACTOR pursuant to a billing statement from CONTRACTOR within 45 days after the later of: (1) the date that OWNER receives the billing statement from CONTRACTOR; (2) the date that a certificate of occupancy or final acceptance notice is issued to CONTRACTOR or OWNER; (3) the date that OWNER (or other authorized building inspector) does not issue a certificate of occupancy but permits partial or complete occupancy of a newly constructed or remodeled building at the Project; or (4) the date that CONTRACTOR accepts the final pay quantities.
- D. **Other Retainage:** Notwithstanding paragraph 2.5A: (1) if CONTRACTOR is in default or breach of the terms and conditions of the Construction Contract, OWNER may withhold from payment for as long as reasonably necessary an amount necessary to cure the breach or default of CONTRACTOR; or (2) if the Project or a portion of the Project has been substantially completed, OWNER may retain until completion up to twice the fair market value of the Work of CONTRACTOR that has not been completed in accordance with the Construction Contract.

2.6 PAYMENT PROCEDURES

- A. **Progress Payments:** CONTRACTOR shall submit Applications for Payment in accordance with Part 14 of the General Conditions (Document 00 72 00). Payment shall not become due or payable for any contract item not provided or installed by CONTRACTOR. As work is performed, OWNER shall pay money due to CONTRACTOR.
 1. **Withholding Payment:** OWNER reserves the right to withhold payment from CONTRACTOR for non-compliance with any provision of the Contract Documents.
 2. **Price Adjustments:** OWNER will consider making partial payment to CONTRACTOR for certain non-conforming work in advance of any negotiated settlement reached between CONTRACTOR and OWNER, provided CONTRACTOR requests in writing that this be done. CONTRACTOR agrees that any such payments made by OWNER are "payments in advance" and that any money that becomes due when the final settlement is negotiated will not constitute payments "withheld" or "retained" under State law.
- B. **Final Payment:** After completion of all Work and Punch List items, OWNER shall pay the Contract Price due after deducting all previous payments, unit price quantity adjustments, penalties, liquidated damages, and other amounts to be retained. All prior progress payments shall be subject to correction in the final payment. The final payment shall not be due and payable until 30 days after approval of the request for final payment by OWNER's finance department.

20__, by _____, the _____ of
[Name of signer] [Title of signer]
_____, a _____.
[Name of entity] [State where organized and type of entity]

Notary's signature

Residing in

My commission expires:

Notary's seal

H. Individual Acknowledgement:

STATE OF UTAH)
 : ss.
COUNTY OF _____)

The foregoing instrument was acknowledged before me this ___ day of _____, 20 __
by _____, an individual.

Notary's signature

Residing in

My commission expires:

Notary's seal

I. **Signature Authority:** At the request of OWNER, evidence satisfactory to OWNER shall be submitted that shows that the person executing this Agreement has the required authority to execute this Agreement. For a corporation such evidence will be in the bylaws or a resolution of the board of directors. For a limited liability company such evidence will be in the operating agreement.

3.3 OWNER'S SUBSCRIPTION AND ATTESTATION

A. Approval as to form: _____
(OWNER's attorney)

B. Approval as to budget: _____
(OWNER's financial officer)

C. OWNER's signature: _____

D. Name and Title: _____

E. Attest: _____
(Signature of City recorder or City recorder designee)

END OF DOCUMENT

DOCUMENT 00 61 13
PERFORMANCE BOND

PART 1 GENERAL

1.1 BOND

- A. Number: _____.
- B. Amount: _____
_____ dollars (\$ _____).

1.2 SURETY

- A. Name: _____
- B. Address: _____

- C. Telephone number: _____
- D. Facsimile number: _____

1.3 CONTRACTOR

- A. Name: _____
- B. Address: _____

- C. Telephone number: _____
- D. Facsimile number: _____

1.4 OWNER

- A. Salt Lake City Corporation, a Utah municipal corporation, 1530 S. West Temple, Suite 101, Salt Lake City, P.O. Box 145506, Salt Lake City, Utah 84114-5506.

1.5 CONSTRUCTION CONTRACT

- A. SLCPU WEST CAMPUS (TENANT IMPROVEMENT)
1805 West 500 South, Salt Lake City
Project No. 512102522

1.6 DEFINED TERMS

- A. Terms used in this Performance Bond which are defined in Article 1.1 of the General Conditions (Document 00 72 00) will have the meanings indicated in the General Conditions.

PART 2 COVENANTS

2.1 SURETY'S AND CONTRACTOR'S RELATIONSHIP

- A. The Surety, as surety, and the CONTRACTOR, as principal, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the OWNER, as obligee, for the performance of the Construction Contract.
- B. If the CONTRACTOR performs the Construction Contract, the Surety and the CONTRACTOR shall have no obligation under this Bond; otherwise this Bond shall remain in full force and effect.

2.2 NOTICE

- A. Notice to the Surety, the OWNER, or the CONTRACTOR shall be sent by registered or certified mail, postage prepaid, by facsimile, by hand delivery, or by overnight delivery service for which a delivery receipt is required, to the address shown on this Bond.
- B. Notices sent as provided in Section 2.2A shall be effective on the date on which such notice was sent.
- C. Notice may be sent by facsimile. Facsimile notice shall be effective on the date of transmission provided that a confirmation establishing the successful transmission of the notice is sent by first-class mail, postage prepaid, along with a copy of the notice transmitted, no later than twenty-four (24) hours after the facsimile notice is transmitted.
- D. If any notice requires a period of less than seven (7) days for response, the notice shall be sent by facsimile.
- E. If the time for response to any notice expires on a Saturday, Sunday, or a legal holiday in the State of Utah, the time shall be extended to the next business day.

2.3 PROCEDURE TO INVOKE SURETY'S OBLIGATION

- A. If the CONTRACTOR fails to perform any of its obligations under the Construction Contract, and such failure to perform has not been waived by the OWNER, the OWNER may notify the CONTRACTOR and the Surety, at their addresses described above, that the CONTRACTOR is in default, and may formally terminate the CONTRACTOR's right to perform its obligations under the Construction Contract.
- B. If the Construction Contract is terminated, the OWNER shall pay the unpaid Balance of the Contract Price to the Surety for completion of the Work in accordance with the terms of the Construction Contract or to a contractor selected by the Surety to perform the Work in accordance with the terms of the Construction Contract.

2.4 SURETY'S OPTIONS AT CONTRACTOR TERMINATION

- A. Surety Completes the Work: The Surety may undertake to perform and complete the Work itself, through its agents, or through independent contractors.
- B. Surety Obtains Bids or Proposals: The Surety may obtain bids or negotiated proposals from qualified contractors acceptable to the OWNER for a contract for performance and completion of the Work.

1. Such bids or proposals shall be prepared by the Surety for execution by the OWNER and the completion contractor selected.
 2. The Surety shall secure the contract with performance and payment bonds executed by a qualified surety equivalent to this Bond and the payment bond (Document 00 61 14).
 3. The Surety shall pay to the OWNER the amount of damages as described in Section 2.6 in excess of the balance of the Contract Price incurred by the OWNER resulting from the CONTRACTOR's default.
- C. Surety to Pay OWNER: The Surety may determine the amount, not to exceed the amount of this Bond specified in Section 1.1B, for which the Surety believes it may be liable to pay, and tender payment therefore to the OWNER. The OWNER has sole discretion to accept payment.

2.5 PROCEDURE FOR OWNER TO DECLARE SURETY IN DEFAULT

- A. The OWNER may declare the Surety to be in default pursuant to the following procedures:
1. The OWNER shall issue an additional written notice to the Surety, after declaring the CONTRACTOR in default as provided in Section 2.3, demanding that the Surety perform its obligations under this Bond; and
 2. The Surety shall respond to the OWNER within 15 days after receipt of the OWNER's additional notice, either denying the claim or accepting liability and exercising its options under Section 2.4.
- B. If the OWNER declines to accept the payment tendered by the Surety pursuant to Section 2.4(C), or if the Surety has denied the claim in whole or in part, the OWNER, without further notice, may pursue any remedies available to the OWNER.

2.6 SURETY'S OBLIGATIONS

- A. After the OWNER has terminated the CONTRACTOR's right to complete its obligations under the Construction Contract, and if the Surety elects to complete the Work under the Construction Contract as provided in Section 2.4, then the responsibilities of the Surety to the OWNER shall not be greater than those of the CONTRACTOR under the Construction Contract, and the responsibilities of the OWNER to the Surety shall not be greater than those of the OWNER under the Construction Contract.
- B. To the limit of the amount of this Bond, but subject to a commitment by the OWNER to pay all valid and proper payments made to or on behalf of the CONTRACTOR under the Construction Contract, the Surety is obligated, without duplication, for:
1. the responsibilities of the CONTRACTOR for correction of Defective Work and completion of the Work under the Construction Contract;
 2. any additional legal, design professional, and delay costs resulting from the CONTRACTOR's default, and resulting from the actions or failure to act of the Surety under Section 2.4; and
 3. liquidated damages that are or may become due for any reason.

2.7 UNRELATED OBLIGATIONS OF THE CONTRACTOR

- A. The Surety shall not be liable to the OWNER for obligations of the CONTRACTOR that are unrelated to the Construction Contract, and the balance of the Contract Price shall not be reduced or changed on account of any such unrelated obligations.
- B. No right of action shall accrue on this Bond to any person or entity other than the OWNER or its heirs, executors, administrators, or successors.

2.8 SURETY WAIVES NOTICE OF ANY CHANGE

- A. Surety hereby waives notice of any change, including changes of Contract Time, Contract Price, and scope of Work, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.

2.9 VENUE

- A. Any suit or action commenced by the OWNER under this Bond shall be in a court of competent jurisdiction in Salt Lake City, Utah.

PART 3 EXECUTION

3.1 EFFECTIVE DATE

- A. The Surety and the CONTRACTOR executed this Bond and declared it to be in effect as of the _____ day of _____, 20__.

3.2 CONTRACTOR'S SUBSCRIPTION AND ACKNOWLEDGMENT

- A. Name of organization: _____
- B. Type of organization: _____
(corporation, partnership, limited liability company, individual, etc.)
- C. CONTRACTOR's signature: _____
- D. Print name here: _____
- E. Title: _____

F. Business Entity Acknowledgement:

STATE OF UTAH)
 : ss.
COUNTY OF SALT LAKE)

The foregoing performance bond was acknowledged before me this _____ day of _____, 20__ by _____, the

_____ [Name of signer]
_____ of _____,
[Title of signer] [Name of entity]

a _____
[State where organized and type of entity]

Notary's signature

Residing in

My commission expires:

Notary's seal

G. Individual Acknowledgement:

STATE OF UTAH)
 : ss.
COUNTY OF _____)

The foregoing performance bond was acknowledged before me this _____ day of _____, 20__ by _____, an individual.

Notary's signature

Residing in

My commission expires:

Notary's seal

H. **Signature Authority:** At the request of OWNER, CONTRACTOR shall submit to OWNER evidence satisfactory to OWNER that shows that the person executing this Bond has the required authority to execute this Bond. For a corporation such evidence will be in the bylaws or a resolution of the board of directors. For a limited liability company such evidence will be in the operating agreement.

3.3 **SURETY'S SUBSCRIPTION AND ACKNOWLEDGMENT**

- A. Attach evidence of Surety's corporate authority to sign.
- B. Surety's signature: _____
- C. Please print name here: _____
- D. Title: _____
- E. Acknowledgment:

STATE OF UTAH)

:

COUNTY OF _____)

The foregoing performance bond was acknowledged before me this __ day of _____, 20__ by _____,

(Name of signee)

the _____ of _____,

(Title of signee)

(Name of entity)

a _____.

(State where organized and type of entity)

Notary's signature

Residing in

My commission expires:

Notary's seal

END OF DOCUMENT

**DOCUMENT 00 61 14
PAYMENT BOND**

PART 1 GENERAL

1.1 BOND

A. Number: _____
B. Amount: _____
_____ dollars (\$ _____)

1.2 SURETY

A. Name: _____
B. Address: _____

C. Telephone number: _____
D. Facsimile number: _____

1.3 CONTRACTOR

A. Name: _____
B. Address: _____

C. Telephone number: _____
D. Facsimile number: _____

1.4 OWNER

A. Salt Lake City Corporation, a Utah municipal corporation, 1530 S. West Temple, Suite 101, P.O. Box 145506, Salt Lake City Utah 84114-5506.

1.5 CONSTRUCTION CONTRACT

A. SLCPU WEST CAMPUS (TENANT IMPROVEMENT)
1805 West 500 South, Salt Lake City
Project No. 512102522

1.6 DEFINED TERMS

A. Terms used in this Payment Bond that are defined in Article 1.1 of the General Conditions (Document 00 72 00) will have the meanings indicated in the General Conditions.

PART 2 COVENANTS

2.1 SURETY'S AND CONTRACTOR'S RELATIONSHIP

- A. The Surety as surety, and the CONTRACTOR, as principal, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the OWNER, as obligee, to pay for labor, materials, and equipment furnished for use in the performance of the Construction Contract.
- B. If the CONTRACTOR makes payment for all labor, materials, and equipment furnished for use in the performance of the Construction Contract, the Surety and the CONTRACTOR shall have no obligation under this Bond; otherwise this Bond shall remain in full force and effect.

2.2 NOTICE

- A. Notice to the Surety, the OWNER, or the CONTRACTOR shall be sent by registered or certified mail, postage prepaid, by facsimile, by hand delivery, or by overnight delivery service for which a delivery receipt is required, to the address shown on this Bond.
- B. Notices sent as provided in Section 2.2A shall be effective on the date on which such notice was sent.
- C. Notice may be sent by facsimile. Facsimile notice shall be effective on the date of transmission provided that a confirmation establishing the successful transmission of the notice is sent by first-class mail, postage prepaid, along with a copy of the notice transmitted, no later than twenty-four (24) hours after the facsimile notice is transmitted.
- D. If any notice requires a period of less than seven (7) days for response, the notice shall be sent by facsimile.
- E. If the time for response to any notice expires on a Saturday, Sunday, or a legal holiday in the State of Utah, the time shall be extended to the next business day.

2.3 CONDITIONS OF SURETY'S LIABILITY

- A. With respect to the OWNER, this Bond shall be null and void if the CONTRACTOR promptly takes the following actions:
 - 1. makes payment, directly or indirectly, for all sums due Claimants; and
 - 2. defends, indemnifies, and saves harmless the OWNER from all claims, demands, Liens, or suits by any person or entity who furnished labor, materials, or equipment for use in the performance of the Work, provided the OWNER has tendered defense of such claims, demands, Liens, or suits to the CONTRACTOR and the Surety.

2.4 PROCEDURE TO INVOKE SURETY'S OBLIGATION

- A. **Concerning Claimants who have a Direct Contract with the CONTRACTOR:** The Surety shall have no obligation to Claimants under this Bond who are employed by or have a direct contract with the CONTRACTOR until such Claimants have given notice to the Surety at the address shown on this Bond and have sent a copy, or notice thereof, to the OWNER, stating that a claim is being made under this Bond and, with substantial accuracy, stating the amount of the claim.

B. Concerning a Claimant who does not have a Direct Contract with the CONTRACTOR: The Surety shall have no obligation to a Claimant under this Bond who does not have a direct contract with the CONTRACTOR until such Claimant takes the following actions.

1. The Claimant furnishes written notice to the CONTRACTOR and sends a copy, or notice thereof, to the OWNER, within 90 days after having last performed labor or last furnished materials or equipment included in the claim stating, with substantial accuracy, the amount of the claim and the name of the party to whom the materials were furnished or supplied or for whom the labor was done or performed;
2. The Claimant either receives a rejection in whole or in part from the CONTRACTOR, or does not receive within 15 days after furnishing the above notice any communication from the CONTRACTOR by which the CONTRACTOR indicates that the claim will be paid directly or indirectly; and
3. Not having been paid within the above 15 days, the Claimant sends a written notice to the Surety at the address described on this Bond and sends a copy, or notice thereof, to the OWNER stating that a claim is being made under this Bond and enclosing a copy of the previous written notice furnished to the CONTRACTOR.

2.5 SURETY'S OPTION TO SETTLE CLAIMS

- A. When the Claimant has satisfied the conditions of Section 2.4, the Surety shall promptly and at the Surety's expense take the following actions:
1. Send an answer to the Claimant, with a copy to the OWNER, within 45 days after receipt of the claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and
 2. Pay or arrange for payment of any undisputed amounts.

2.6 SURETY'S OBLIGATION

- A. The Surety's total obligation under this Bond shall not exceed the amount of this Bond, and the amount of this Bond shall be reduced in the amount of any payments made in good faith by the Surety.

2.7 UNRELATED OBLIGATIONS OF THE CONTRACTOR

- A. The Surety and the OWNER shall not be liable to Claimants or others for obligations of the CONTRACTOR that are unrelated to the Construction Contract.
- B. The OWNER shall not be liable for payment of any damages, costs, or expenses of any Claimant under this Bond, and shall have under this Bond no obligation to make payments to, give notices on behalf of, or otherwise have obligations to Claimants under this Bond.

2.8 SURETY WAIVES NOTICE OF ANY CHANGE

- A. Surety hereby waives notice of any change to the Construction Contract including changes of Contract Time, Contract Price, and scope of Work, or to related subcontracts, purchase orders, or other obligations.

2.9 VENUE

A. Any suit or action commenced by a Claimant under this Bond shall be in a court of competent jurisdiction in Salt Lake City, Utah.

2.10 COPIES OF THIS BOND

A. Upon request by any person or entity appearing to be a potential beneficiary of this Bond, the CONTRACTOR or the OWNER shall promptly furnish a copy of this Bond or shall permit a copy to be made.

PART 3 EXECUTION

3.1 EFFECTIVE DATE

A. The Surety and the CONTRACTOR executed this Bond and declared it to be in effect as of the _____ day of _____, 20__.

3.2 CONTRACTOR'S SUBSCRIPTION AND ACKNOWLEDGMENT

A. Name of organization: _____

B. Type of organization: _____
(corporation, partnership, limited liability company, individual, etc.)

C. CONTRACTOR's signature: _____

D. Please print name here: _____

E. Title: _____

F. Business Entity Acknowledgement:

STATE OF UTAH)

: ss.

COUNTY OF _____)

The foregoing payment bond was acknowledged before me this _____ day of _____, 20__ by _____, the

[Name of signer]

_____ of _____,

[Title of signer]

[Name of entity]

a _____

[State where organized and type of entity]

Notary's signature

Residing in

My commission expires:

Notary's seal

G. Individual Acknowledgement:

STATE OF UTAH)

: ss.

COUNTY OF _____)

The foregoing payment bond was acknowledged before me this _____ day of _____

_____, 20__ by _____, an individual.

Notary's signature

Residing in

My commission expires:

Notary's seal

H. **Signature Authority:** At the request of OWNER, CONTRACTOR shall submit to OWNER evidence satisfactory to OWNER that shows that the person executing this Bond has the required authority to execute this Bond. For a corporation such evidence will be in the bylaws or a resolution of the board of directors. For a limited liability company such evidence will be in the operating agreement.

3.3 **SURETY'S SUBSCRIPTION AND ACKNOWLEDGMENT**

- A. Attach evidence of Surety's corporate authority to sign.
- B. Surety's signature: _____
- C. Print name here: _____
- D. Title: _____
- E. Acknowledgment:

STATE OF UTAH)

:

COUNTY OF _____)

The foregoing payment bond was acknowledged before me this ____ day of _____, 20__ by _____,

(Name of signee)

the _____ of _____,

(Title of signee)

(Name of entity)

a _____.

(State where organized and type of entity)

Notary's signature

Residing in

My commission expires:

Notary's seal

END OF DOCUMENT

DOCUMENT 00 62 11
SUBMITTAL TRANSMITTAL FORM

PART 1 GENERAL

1.1 SUMMARY

- A. Form is self-transmittal. Letter of transmittal is not required.
- B. Submittals requiring expeditious handling must be submitted individually on Submittal Transmittal Form.
- C. ENGINEER's review of submittals does not release or relieve CONTRACTOR from complying with all requirements of the Contract Documents.

1.2 ENGINEER'S FORM

- A. An example of the ENGINEER's form is as follows:

<u>SUBMITTAL REVIEW</u>	
<input type="checkbox"/> NO EXCEPTIONS TAKEN	<input type="checkbox"/> REJECTED
<input type="checkbox"/> MAKE CORRECTIONS NOTED	<input type="checkbox"/> RESUBMIT
<input type="checkbox"/> SUBMIT SPECIFIED ITEM	<input type="checkbox"/> DO NOT RESUBMIT
<p>This review is for general conformance with the design concepts of the Work and general compliance with the Contract Documents and does not constitute an approval or variance. Corrections or comments, or the failure to make them, on this review does not relieve the CONTRACTOR from full contract compliance.</p> <p>The CONTRACTOR is responsible for compliance with all contract provisions, dimensions, sizes, capacities, fabrication and construction techniques, installation, coordinating work with others, and performing the Work in a safe and satisfactory manner.</p> <p>Date: _____ By: _____</p> <p style="text-align: center;">SALT LAKE CITY ENGINEERING</p>	

- B. Meaning of ENGINEER's form:

- 1. No Exceptions Taken: Submittals have been reviewed and no corrections were noted.
- 2. Make Corrections Noted: Submittals that have only minor discrepancies. Resubmission will not be required unless the stamp is marked "Resubmit".
- 3. Submit Specified Item: Submittals that are incomplete or require more than minor corrections will be annotated to indicate necessary corrections. Resubmit the part of the submittal showing the corrections.
- 4. Rejected: Submittals that are fundamentally in error, cover wrong equipment or construction, or require extensive corrections.
- 5. Resubmit: Submittals that require resubmission. Make corrections required, note any changes by dating the revisions to correspond with the change require date, and resubmit the corrected material.
- 6. Do Not Resubmit: Submittals that are not necessary to resubmit.

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SUBMITTAL TRANSMITTAL FORM	DATE	<input type="checkbox"/> NEW SUBMITTAL <input type="checkbox"/> RESUBMITTAL
-----------------------------------	------	--

Section I	REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS (This section will be initiated by the CONTRACTOR)
------------------	--

TO	FROM	TRANSMITTAL No.
		PREVIOUS TRANSMITTAL No.

SPECIFICATION SECTION NUMBER (See instructions)	CONTRACT TITLE	CONTRACT No.
---	----------------	--------------

SUBMITTAL ITEM No. a.	DESCRIPTION OF ITEM SUBMITTED (Type, size, model number, etc.) b.	SAMPLE OR CERTIFICATE (See instructions) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT		VARIATION (See instructions) g.
				SPEC. PARA. No. e.	DRAWING SHEET No. f.	

REMARKS	<p>I certify that the above submitted items have been reviewed in detail and are correct and conform with the contract Drawings and specifications except as otherwise noted.</p> <p>_____</p> <p>NAME AND SIGNATURE OF CONTRACTOR</p>
----------------	--



INSTRUCTIONS

1. TRANSMITTAL No: Number each transmittal consecutively in the space entitled “Transmittal No.”. This number will identify each submittal.
2. PREVIOUS TRANSMITTAL No: Mark the box for re-submittal and insert the transmittal number of last submission as well as the new submittal number in the spaces provided. Each re-submittal will become a new transmittal.
3. SPECIFICATION SECTION NUMBER: Cover only one specification section with each transmittal.
4. Column “a”: For each entry on this form, the “SUBMITTAL ITEM No.” will be the same SUBMITTAL ITEM No. indicated on the Submittal Register (Form 01 33 00).
5. Column “c”: When a sample of material or Manufacturer’s Certificate of Compliance is transmitted, indicate “Sample” or “Certificate”.
6. Column “g”: CONTRACTOR will place a check mark in the “Variation” column when a submittal is not in accordance with the plans and specifications – also, a written statement to that effect shall be included in the space provided for “Remarks” or on a separate page.
7. ENGINEER shall return a Submittal Review Response form.

END OF SECTION

DOCUMENT 00 62 16
CERTIFICATE OF INSURANCE

PART 1 GENERAL

1.1 PROCEDURE

- A. For filing purposes, add Certificates of Insurance to the Contract Documents following this page.

END OF DOCUMENT

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DOCUMENT 00 65 13
CERTIFICATE OF SUBSTANTIAL COMPLETION

PART 1 GENERAL

1.1 DOCUMENT INCLUDES

- A. Certificate of Substantial Completion Form.

1.2 REFERENCES

- A. APWA Section 01 78 50 – Closeout Procedures.

1.3 SUBSTANTIAL COMPLETION

- A. When Work or designated portion thereof is Substantially Complete, a notice per paragraph 1.3A in APWA Section 01 78 50 is to be submitted.
- B. The attached form also requests final inspection.
- C. ENGINEER's review of notice does not release or relieve CONTRACTOR from complying with all requirements of the Contract Documents.

END OF DOCUMENT

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**CONTRACTOR'S
CERTIFICATE OF SUBSTANTIAL COMPLETION**
(and request for Final Inspection)

DATE _____

PROJECT NAME AND NUMBER

SLCPU WEST CAMPUS (TENANT IMPROVEMENT)

1805 West 500 South, Salt Lake City

Project No. 512102522

PORTION OF WORK COMPLETE

CERTIFICATION

I certify that I, _____ (name) am
an authorized official of _____ (company)
working in the capacity of _____ and have
been duly authorized by said company to make the following statements.

- A. As the CONTRACTOR's representative, I do hereby certify by personal knowledge that all Work or portion of the Work described above has been performed in every particular in accordance with and conformance to the Contract Documents and that the Work or portion of the Work is ready for Final Inspection.
- B. It is understood that neither the determination of the ENGINEER that the Work is Substantially Complete, nor the acceptance thereof, shall operate to bar claims against the CONTRACTOR for non-compliance with the Contract Documents.

I hereby request the ENGINEER accept the Work as being Substantially Complete and schedule the Final Inspection.

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SECTION 00 73 00

SPECIAL PROVISIONS

The following special provisions apply to all technical sections for the work in this Project Manual.

1. WARRANTY

- A. The following warranty conditions shall apply for all products unless otherwise modified in the individual specifications:
 - 1. A written material warranty guarantee of **3 years** minimum shall be provided by the manufacturer against any breakdown of the material effectiveness of the structural repair elements. Contractor shall submit a warranty document certifying the material is protected against defects for the entire length of the warranty period.
 - 2. A written workmanship warranty guarantee of **3 years** minimum shall be provided by the Contractor against any shortcomings of the workmanship. Contractor shall submit a warranty document certifying the workmanship is protected against defects for the entire length of the warranty period.
 - 3. A warranty inspection may be conducted in the 11th and 35th months or anytime following the final acceptance of the work. At their option, the Contractor and a representative of the manufacturer may participate in the inspection. Inspection shall be conducted by OWNER. All deficiencies shall be repaired at Contractor's expense in a manner mutually agreed by OWNER and Contractor.

2. CONTRACTOR'S RESPONSIBILITIES

- A. Locate and designate all existing manholes and new manhole or structure access points as necessary for the Work. Where existing manholes are to be used for installation of rehabilitation methods, enlarge existing openings into the pipe as required to install the products and provide for the removal and replacement of manhole cones, grade rings, ring and covers as required. Condition of existing manholes may require complete replacement at access points. Some manholes have been noted as offset manholes. If an offset manhole is used as an access point, the manhole shall be removed and replaced with a new manhole.
- B. OWNER or ENGINEER shall determine if condition of surrounding pipe warrants replacement. Where new structures are necessary or existing structures will be modified or otherwise disturbed, provide a stamped design and installation plan from a Professional Engineer registered in the state of Utah. Provide for installation of new or modified structures and complete restoration of all areas disturbed by Contractor operations.
- C. All manhole work including enlarging of access points, manhole repair, and new manhole installation shall be as indicated on the Drawings. All work designs, plans and proposals are to be submitted to the OWNER or ENGINEER for review and approval. All work will be in accordance with the APWA Standard Plans and Specifications and as required and approved by the OWNER or ENGINEER.
- D. The Contractor shall obtain access to water hydrants for cleaning, installation and other work items requiring water. Contractor shall comply with all connection and use

requirements. The contractor shall obtain a fire hydrant meter from Salt Lake City Public Utilities and pay a refundable one thousand dollar (\$1000.00) deposit. There shall be no charge for water used through the fire hydrant meter for the project.

- E. Provide Blue Stakes locating and marking of all existing utilities in areas where excavation is to be performed prior to beginning any excavation. Contractor to field locate and mark limits of any excavation work required. Utilities are shown on the Drawings for informational purposes only. The indication of utilities in the Drawings shall not be construed by the Contractor to mean that all utilities are shown in the Drawings, or that those shown are in the exact location.
- F. Provide for protection of all existing facilities and restoration of all areas disturbed by the Contractor operations as specified. If utilities relocation is required, Contractor shall coordinate with utility owner to relocate utility under provisions of the Salt Lake City Utility franchise agreements.

3. TRAFFIC CONTROL

- A. The Contractor shall follow all traffic control guidelines as specified in the Traffic Control section.

4. FIELD VERIFICATION OF DIMENSIONS

- A. The existing sewer has deteriorated due to hydrogen sulfide corrosion. The Contractor shall verify the actual diameter before ordering or manufacturing any products to be used during the rehabilitation Work. The cross sectional area has been laser profiled and CCTV inspected. Laser profiling shall be used as a reference only. The report and CCTV files will be available to the Contractor at the Salt Lake City Department of Public Utilities office. The Contractor is responsible for field verifying the inside dimensions of the sewer prior to ordering, preparing, or installing any rehabilitation materials. A mandrel test shall be performed as specified in the individual rehabilitation sections.
- B. The manhole depths, manhole locations, and pipeline lengths indicated on the drawings are approximate. Contractor shall verify all dimensions before ordering or manufacturing any products to be used during the rehabilitation work.

5. PHOTOGRAPHS AND DVD RECORDING

- A. Prior to start of construction, photographs and DVD recording shall be taken by the Contractor where excavations or entry onto private property are required during construction to show utility crossings, installation of bypass piping, excavations, installation of lining system, and repair or construction of manholes or access structures. The Contractor shall include all existing structures, vegetation, and general conditions of the work site.
- B. The DVD's shall be high quality video MPG1 format on DVD -R/+R disks or digital media (flash drive or portable hard drive) formatted to be compatible with PC systems. The .MPG file should contain an audio track that narrates the progression of the camera through the site. Photographs shall be digital (6.0 mega pixel minimum) of foundations, driveways and other areas of potential damage.
- C. After completion of the construction and restoration, photographs and DVD's shall be taken by the Contractor from the same points in the same direction as the pre-construction

examination.

- D. DVD's and photographs shall be submitted to the OWNER or ENGINEER within seven (7) days prior to substantial completion and prior to acceptance of the work by the OWNER or ENGINEER.

6. PRE-CONSTRUCTION SUBMITTALS

- A. The following shall be submitted for review prior to the start of construction:
 - 1. Items listed in the individual sections.
 - 2. Access points and pit locations and dimensions, as required. Limits on locations for access points are indicated on the Drawings. Access points outside these limits shall require review and approval by the OWNER or ENGINEER for each deviated location.
 - 3. Access structure details, as required. Drawings shall be stamped by a Professional Engineer registered in the State of Utah and include the following:
 - a. Dimensions.
 - b. Reinforcement.
 - c. Locations.
 - 4. Groundwater management plan and a State of Utah groundwater permit application.
 - 5. Traffic Control plan submittal as specified.
 - 6. Safety plan with a list of hazards and mitigation methods.
 - 7. Quality Control and testing plan.
- B. Each submittal shall cover items from only one section of the specification unless the item consists of components from several sources. Contractor shall submit a complete initial submittal including all components. When an item consists of components from several sources, Contractor's initial submittal shall be complete including all components.
- C. All submittals, regardless of origin, shall be approved by Contractor and clearly identified with the name and number of this Contract, Contractor's name, and references to applicable specification paragraphs and Contract Drawings. Each copy of all submittals, regardless of origin, shall be stamped or affixed with an approval statement of Contractor. Each submittal shall indicate the intended use of the item in the Work. When catalog pages are submitted, applicable items shall be clearly identified and inapplicable data crossed out. The current revision, issue number, and date shall be indicated on drawings and other descriptive data.
- D. Contractor shall be solely responsible for the completeness of each submittal. Contractor's stamp or affixed approval statement of a submittal, per the Submittal Transmittal Form, is a representation to OWNER or ENGINEER that Contractor accepts sole responsibility for determining and verifying all quantities, dimensions, field construction criteria, materials, catalog numbers, and similar data, and that Contractor has reviewed and coordinated each submittal with the requirements of the Work and the Contract Documents.

- E. All deviations from the Contract Documents shall be identified as deviations on each submittal. Such submittals shall, as pertinent to the deviation, indicate essential details of all changes proposed by Contractor (including modifications to piping other facilities that may be a result of the deviation).
- F. Two hard copies of each drawing and the necessary data shall be submitted to OWNER or ENGINEER. OWNER or ENGINEER will return two marked copies (or one marked reproducible copy) to Contractor. Facsimile (fax) or electronic copies will not be acceptable. OWNER or ENGINEER will not accept submittals from anyone but Contractor. Submittals shall be consecutively numbered in direct sequence of submittal and without division by subcontracts or trades
- G. OWNER or ENGINEER's review of submittals covers only general conformity to the Drawings and Specifications, external connections, and dimensions that affect the layout; it does not indicate thorough review of all dimensions, quantities, and details of the material, equipment, device, or item covered. OWNER or ENGINEER's review shall not relieve Contractor of sole responsibility for errors, omissions, or deviations in the drawings and data, nor of Contractor's sole responsibility for compliance with the Contract Documents.
- H. OWNER or ENGINEER's submittal review period shall be 28 consecutive calendar days and shall commence on the first calendar day following receipt of the submittal or resubmittal in OWNER or ENGINEER's office. The time required to mail the submittal or resubmittal back to Contractor shall not be considered a part of the submittal review period.
- I. Contractor shall accept full responsibility for the completeness of each resubmittal. Contractor shall verify that all corrected data and additional information previously requested by OWNER or ENGINEER are provided on the resubmittal.
- J. When corrected copies are resubmitted, Contractor shall direct specific attention to all revisions in writing and shall list separately any revisions made other than those called for by OWNER or ENGINEER on previous submittals. Requirements specified for initial submittals shall also apply to resubmittals. Resubmittals shall bear the number of the first submittal followed by a letter (A, B, etc.) or a unique identification that indicates the initial submittal and correct sequence of each resubmittal

8. PERMITS REQUIRED

- A. All permits required for this project will be paid at cost.
- B. Supplement the permit list given in Section 01 33 00 1.5 to include:
 - 1. Traffic Control—Traffic Control plan approval required to get the Public Way permit.
 - 2. Public Way Excavation—Fee permit issued by UDOT based on the amount of excavation completed in the public right-of-way.
 - 3. Noise—No-cost permit issued by Salt Lake Valley Health Department (SLVHD), 788 E. Woodoak Lane, Murray, Utah 84107.
 - a. The requirements of the SLVHD noise permit is built around keeping noise in residential neighborhoods no more than 10 dB(A) above ambient between 7:00 AM to 10:00 PM and no more than 5 dB(A) above ambient outside those hours

(nighttime). A waiver may be applied for to work outside the SLVHD specified regular working hours of 7:00 AM to 10:00 PM.

9. WORKING HOURS

- A. The specifications originally called for 8:00 AM to 5:00 PM, five days per week.
- B. The work hours need to be controlled as much as possible to minimize disturbances to adjacent residences. The OWNER or ENGINEER may permit Work outside normal project work hours but the CONTRACTOR shall still comply with appropriate noise, safety, environmental, odor and other requirements.
- C. Contractor may conduct nighttime work as allowed under applicable permitting authority (SLVHD) and based on prior schedule approval 2-weeks in advance by OWNER or ENGINEER and subject to local neighborhood coordination. Nighttime work will be limited to times when continuous operations are required for material curing (e.g. grout, resin curing) and not for Contractor convenience. Contractor will be allowed up to, but not more than, 16 separate extended work operation periods up to 72 hours each as noted herein.

END OF SECTION

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DOCUMENT 00 73 10
MODIFICATIONS TO THE GENERAL CONDITIONS
(Supplementary Conditions)

This document changes provisions specified in the General Conditions (Document 00 72 00) in the Manual of Standard Specifications published by the Utah Chapter of the American Public Works Association.

Add the following paragraphs to Article 2.2

2.2 COPIES OF DOCUMENTS

- B. OWNER shall not furnish to CONTRACTOR published Contract Documents that include the 2012 edition of the Manual of Standard Plans and the Manual of Standard Specifications. The CONTRACTOR shall purchase such documents separately.
- C. Copies of all Contract Documents including the 2012 edition of the Manual of Standard Plans and the Manual of Standard Specifications shall be provided on site by the CONTRACTOR.

Modify paragraph 2.5C

2.5 BEFORE STARTING CONSTRUCTION

- C. Field Office: An on-site field office is not required however, CONTRACTOR shall provide and maintain a telephone in the field during performance of the Work such that ENGINEER may always contact CONTRACTOR for transmittal of Plans and instructions and, for dissemination of project information.

Modify Article 5.1

5.1 PERFORMANCE, PAYMENT AND OTHER BONDS

- A. Before OWNER executes the Agreement, CONTRACTOR shall file with OWNER a good and sufficient Performance Bond (using OWNER's Document 00 61 13) and a Payment Bond (using OWNER's Document 00 61 14), each in the sum of not less than 100 percent of the Contract Price.
- B. The Bonds shall be executed by CONTRACTOR and issued by a company duly and regularly authorized to do a general surety business in the State of Utah and either (i) named in the current U.S. Treasury Department's listing of approved sureties (Department Circular 570) (as amended), or (ii) with a current "A-" rating and a financial size category rating of at least a "VII" or better in A.M. Best Co., Inc.'s Best Insurance Reports, Property and Casualty Edition.
- C. The Performance Bond shall guarantee the faithful performance of the Construction Contract by CONTRACTOR and the Payment Bond shall guarantee the payment of labor and materials. The Bonds shall inure by their terms to the benefit of OWNER. Neither

this nor any other provision requiring a Performance Bond shall be construed to create any rights in any third party Claimant as against OWNER for performance of the Work under the Construction Contract.

- D. If the surety on any Bond furnished by CONTRACTOR is subject to any proceeding under the Bankruptcy Code (Title 11, United States Code) or becomes insolvent or its right to do business is terminated in the State of Utah or it ceases to meet the requirements of this Article, CONTRACTOR shall, within 15 days thereafter, substitute another Bond and surety, both of which must be acceptable to OWNER.

Modify Article 5.2

5.2 INSURANCE

A. In General:

1. Any insurance coverage required herein that is written on a “claims made” form rather than on an “occurrence” form shall (i) provide full prior acts coverage or have a retroactive date effective before the date of the Agreement, and (ii) be maintained for a period of at least three (3) years following the end of the term of the Agreement or contain a comparable “extended discovery” clause. Evidence of current extended discovery coverage and the purchase options available upon policy termination shall be provided to OWNER.
2. All policies of insurance shall be issued by insurance companies licensed to do business in the state of Utah and either:
 - a. Currently rated A- or better by A.M. Best Company; and
 - b. The insurer must also have an A.M. Best Company financial size category rating of not less than VII.

-OR-

- c. Listed in the United States Treasury Department’s current *Listing of Approved Sureties (Department Circular 570)*, as amended.
3. CONTRACTOR shall furnish certificates of insurance, acceptable to OWNER, verifying the foregoing matters concurrent with the execution of the Agreement and thereafter as required.
4. In the event any work is subcontracted, CONTRACTOR shall require its subcontractor, at no cost to OWNER, to secure and maintain all minimum insurance coverages required of CONTRACTOR hereunder. If professional liability insurance is required by Paragraph 5.2B below, a subcontractor (or supplier) must provide such insurance only if such subcontractor’s (or supplier’s) product requires the stamp of a Professional Engineer licensed in the State of Utah.
5. All required certificates and policies shall provide that coverage thereunder shall not be canceled or modified without providing, in a manner approved by the City Attorney, 30 days prior written notice to OWNER.
6. If any of the policies of insurance required from CONTRACTOR are cancelled or lapse or if OWNER requests a renewal certificate of insurance showing that the insurance is

currently in force and CONTRACTOR fails to deliver the certificate to OWNER within 15 days after such request, OWNER may, at OWNER's sole discretion, obtain substitute coverage at reasonable rates. OWNER may deduct the cost of such insurance coverage, plus ten percent (10%) for administrative charges, from any monies owing to CONTRACTOR.

B. Required Insurance Policies: CONTRACTOR, at its own cost, shall secure and maintain during the term of this Construction Contract, including all renewal terms, the following minimum insurance coverage:

1. Worker's compensation and employer's liability insurance sufficient to cover all of CONTRACTOR's employees pursuant to Utah law. In the event any work is subcontracted, CONTRACTOR shall require its subcontractor(s) similarly to provide worker's compensation insurance for all of the latter's employees, unless a waiver of coverage is allowed and acquired pursuant to Utah law.
 - a. OWNER should not be an additional insured for worker's compensation insurance.
2. Commercial general liability (CGL) insurance with OWNER as an additional insured, in the minimum amount of \$2,000,000 per occurrence with a \$3,000,000 general aggregate and \$3,000,000, products and completed operations aggregate. These limits can be covered either under a CGL insurance policy alone, or a combination of a CGL insurance policy and an umbrella insurance policy and/or a CGL insurance policy and an excess insurance policy. (OWNER need not be listed as an additional insured on umbrella and/or excess insurance, only on the underlying policy). The policy shall protect OWNER, CONTRACTOR, and any subcontractor from claims for damages for personal injury, including accidental death, and from claims for property damage that may arise from Contractor's operations under the Agreement, whether performed by CONTRACTOR itself, any subcontractor, or anyone directly or indirectly employed by either of them. Such insurance shall provide coverage for premises operations, acts of independent contractors, and completed operations.
3. Commercial automobile liability insurance that provides coverage for owned, hired, and non-owned automobiles, in the minimum amount of a combined single limit of \$2,000,000 per occurrence or \$1,000,000 liability per person, \$2,000,000 liability per occurrence, and \$250,000 property damage. These limits can be reached either with a commercial automobile liability insurance policy alone, or with a combination of a commercial automobile liability insurance policy and an umbrella insurance policy and/or a commercial automobile liability insurance policy and an excess insurance policy.
3. CONTRACTOR shall not operate a vehicle in connection with any services rendered under the Agreement. Inasmuch as CONTRACTOR agrees not to operate a vehicle in connection with services rendered under the Agreement, OWNER shall not require CONTRACTOR to provide commercial automobile liability insurance.

4. Builder's Risk: Builder's risk insurance with a policy limit equal to the total amount of the Contract Price. The policy shall be written on an "All Risk" coverage basis with OWNER as a "named insured" and "loss payee".
 5. Professional liability insurance in the minimum amount of \$2,000,000 per claim made with a \$2,000,000 annual aggregate limit. If CONTRACTOR is not eligible to obtain such insurance, CONTRACTOR's obligation is satisfied if a subcontractor (or supplier) provides such insurance.
 6. Pollution liability insurance, with OWNER as an additional insured, in the minimum amount of \$1,000,000 per occurrence with a \$2,000,000 annual aggregate limit.
- C. Government of Salt Lake County Additional Insured: Each policy of insurance provided in the Contract Documents shall also protect the government of Salt Lake County during the life of the Construction Contract and at all time thereafter.

Add the following paragraphs to Article 6.7

6.7 PERMITS

- H. Salt Lake City Permits: In addition to any other permits required for the Work, CONTRACTOR shall obtain permits from Salt Lake City Corporation for Work on the Project.
1. OWNER-Paid Permits: CONTRACTOR shall be responsible for submitting plans, scheduling inspections and paying all costs incidental to such actions as required for any permit required by Salt Lake City Corporation. Except for construction water meter fees, the fees for these permits shall be paid by OWNER and shall not be included in CONTRACTOR's bid. The following list is not exclusive and does not relieve CONTRACTOR of the responsibility of obtaining all permits.
 - a. From Salt Lake City's Community & Economic Development Department, Division of Transportation, 349 South 200 East, Suite 450, Salt Lake City, Utah 84111. Phone 801-535-6630
 1. Parking meter bagging and removal permit
 2. Street closure permit
 3. Traffic control permit
 4. Any other applicable Division of Transportation imposed fee
 - b. From Salt Lake City's Department of Public Utilities, 1530 South West Temple Street, Salt Lake City, Utah 84115
 1. UPDES storm drain water discharge permit for sites 1 to 5 acres
 2. All applicable water, fire, sewer and storm drainage impact and connection fees
 3. ¾ inch meter permit for new and existing drinking fountain

c. From Salt Lake City Building Services and Licensing, 451 South State Street, Salt Lake City, Utah 84111. Phone 801-535-7751

1. Building, plumbing, mechanical, electrical permit (as applicable)

2. CONTRACTOR-Paid Permits: The fees for permits not paid for by OWNER shall be included in CONTRACTOR's Bid. The following list is not exclusive and does not relieve CONTRACTOR of the responsibility of obtaining all permits:

a. Construction Water Meter: If water for construction is required to be taken from fire hydrants or a new water meter, CONTRACTOR shall be solely responsible for obtaining and paying for such permits and water usage to Salt Lake City Corporation's Department of Public Utilities permit office, 1530 South West Temple Street, Salt Lake City, Utah.

1. Hydrant meters require a \$1,000.00 deposit (\$100.00, non-refundable). A refund will be returned to CONTRACTOR by the Department of Public Utilities if the meter and equipment is returned undamaged.

I. Other Permits: All other permit fees required by Salt Lake County, the State of Utah, the United States of America, and any of their agencies, or by any private utility companies, shall be paid for and obtained by CONTRACTOR and included in CONTRACTOR's Bid. The following list is not exclusive and does not relieve CONTRACTOR of the responsibility of obtaining all permits:

1. UDOT District 2: Digging permit in a UDOT roadway right of way.

2. Private Property Owner Permit: Written permission to use private water.

3. Private Property Owner Permit: Written permission to store product, equipment, materials, and supplies outside of the Work site boundaries.

4. General Permit for Storm Water Discharge (Sites greater than 5 acres): From the State of Utah, Department of Environmental Quality, Division of Water Quality, 288 North 1460 West Street. P.O. Box 144870, Salt Lake City, Utah 84114-4879. Fee varies; contact the State for a quote.

5. Flood Control Permit: From Salt Lake County, Department of Public Works, Division of Flood Control, 2001 South State Street, Salt Lake City, Utah.

6. Monument Permit: From Salt Lake County Surveyor, 2001 South State Street, Salt Lake City, Utah. Fee will be at least \$100.00 per monument and is based upon time of performance.

Modify paragraph 6.17A and add paragraph 6.17E

6.17 INDEMNIFICATION

A. **Indemnification of OWNER:** Subject to paragraph 6.17E below, CONTRACTOR shall indemnify, hold harmless, and defend OWNER and ENGINEER and their agents and employees from and against any and all claims, damages, losses, and expenses, direct,

indirect, or consequential (including, but not limited to fees and charges of engineers, architects, attorneys, and other professionals, and court costs) arising out of or resulting from the willful or negligent acts or omissions in performance of the Work by CONTRACTOR, any Subcontractor, any person or organization directly or indirectly employed by any of them to perform or furnish any of the Work, or anyone for whose acts any of them may be liable, regardless of whether or not the claim, damage, loss, etc. arising from the act or omission is caused in part by a party indemnified hereunder or arises by or is imposed by Law and regulations regardless of the negligence of any such party. CONTRACTOR's duty to defend OWNER, ENGINEER and their agents and employees shall exist regardless of whether OWNER, ENGINEER, their agents or employees, or CONTRACTOR or its agents may ultimately be found to be liable for anyone's negligence or other conduct.

- E. Nothing herein shall be construed to require CONTRACTOR to indemnify OWNER, ENGINEER, or their agents or employees for any damages that are caused by or result from the fault of OWNER, ENGINEER, or their agents or employees.

Modify paragraph 13.3C.3

13.3 TESTS AND INSPECTIONS

- C. Costs of Inspections Assessable to:

- 3. The cost of all inspections, tests, and approvals in addition to the above that are required by the Contract Documents shall be paid by CONTRACTOR.

Modify paragraph 13.6A

13.6 CORRECTION OR REMOVAL OF DEFECTIVE WORK BY CONTRACTOR

- A. In addition to CONTRACTOR'S obligations under Article 6.16, if required by ENGINEER, CONTRACTOR shall promptly, as directed, either correct all Defective Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by ENGINEER, remove it from the site and replace it with non-Defective Work. No rejected material, the defects of which have been subsequently corrected, shall be used in the Work unless approval in writing has been given by ENGINEER. CONTRACTOR shall bear all direct, indirect, and consequential costs of such correction or removal (including but not limited to fees and charges of OWNER, engineers, architects, and other professionals) made necessary thereby.

Modify paragraph 13.7A

13.7 CORRECTION PERIOD

- A. In addition to CONTRACTOR'S obligations under Article 6.16, if any portion of the Work is found to be defective within one year after the date of Substantial Completion, CONTRACTOR shall correct it or replace it with non-Defective Work. The one year correction period may be superseded by such longer period of time as prescribed in the Contract Documents or by special guarantee terms required by the Contract Documents.

Add the following paragraph to Article 13.7

13.7 CORRECTION PERIOD

- E. Nothing contained in this Article 13.7 shall be construed to establish a period of limitation with respect to other obligations CONTRACTOR has under the Contract Documents, including Article 6.16. Establishment of the one year period for correction of Work as described in this Article 13.7 relates only to the specific obligation of CONTRACTOR to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be enforced, nor the time within which proceedings may be commenced to establish CONTRACTOR'S liability with respect to CONTRACTOR'S obligations other than specifically to correct the Work. Such times include the applicable statute of limitations or statute of repose, which may be longer than one year.

Add the following Articles to Part 16

PART 16 DISPUTE RESOLUTION

16.2. GENERAL

- A. Unless a decision is held by an appropriate court of law to have been procured by fraud or to be arbitrary and capricious or so grossly erroneous as necessarily to imply bad faith, any factual decision made under this dispute resolution procedure shall be final and binding in any suit or action arising under the Construction Contract, including any actions by CONTRACTOR or others against OWNER or any of OWNER's agents, consultants, or employees.
- B. Compliance by CONTRACTOR with provisions of this Part shall be a condition precedent to any legal action by CONTRACTOR or any of CONTRACTOR's Subcontractors and Suppliers against OWNER or any of OWNER's agents, consultants, or employees.
- C. The provisions of this Part shall not preclude or limit judicial review of issues of law.
- D. Ambiguities in or between Contract Documents shall be construed in favor of the OWNER.

16.3 DISPUTES NOT RELATED TO THE GUARANTEE OF THE WORK

- A. Any dispute arising under the Construction Contract concerning a question of fact, not related to the guarantee of the Work (Article 13.1 of the General Conditions (Document 00 72 00)), that is not disposed of by contract Modification shall be decided pursuant to the following procedure.
 - 1. Any decision by ENGINEER interpreting the requirements of the Contract Documents may be appealed in writing to the ENGINEER. The ENGINEER's decision, regarding that appeal shall be reduced to writing and a copy shall be mailed or otherwise furnished to CONTRACTOR within 10 days. The decision of ENGINEER shall be final and conclusive unless, within 30 days after the date of receipt of such copy,

CONTRACTOR mails or otherwise furnishes to ENGINEER a written appeal to the head of OWNER's department responsible for constructing the project.

2. Within 15 days from the receipt of any such appeal, the department head shall issue a decision in writing and mail or otherwise furnish a copy thereof to CONTRACTOR. The decision of the department head shall be final and conclusive unless, within 15 days from the date of receipt of such decision, the CONTRACTOR mails or otherwise furnishes to the department head a written appeal to OWNER's Committee.
3. The Dispute Committee shall consist of three persons selected by the department head who are knowledgeable about the Work.
4. OWNER and CONTRACTOR shall each have the opportunity to fully present its case to the Dispute Committee before the Dispute Committee's deliberation. The Dispute Committee may request any other materials or written memoranda necessary to consider the issues, and may schedule other proceedings as necessary.
5. The decision of the Dispute Committee shall be rendered in writing within 15 days after the Dispute Committee's final hearing of the issue and receipt of any supplemental material requested by the Dispute Committee. The decision shall be mailed or otherwise delivered to CONTRACTOR.
6. The decision of the Dispute Committee shall be the final binding interpretation of the facts that are the subject of the appeal.

16.4 DISPUTES RELATED TO THE GUARANTEE

- A. Except as otherwise provided by contract Modification, any dispute concerning a question of fact involving or arising out of the guarantee required by the Contract Documents (Article 13.1 of the General Conditions (Document 00 72 00)), that is not disposed of by contract Modification, shall be decided pursuant to the provisions of Paragraph 16.3 above, except that the initial factual decision shall be issued in writing by the ENGINEER, together with the department head.
- B. Any appeal therefrom shall be made within 15 days directly to the Dispute Committee where such disputes shall be governed by provisions in sub-paragraphs 3 to 6 in paragraph 16.3A above.

16.5 WORK DURING APPEAL

- A. Notwithstanding the pendency of any protest or appeal provided above, CONTRACTOR shall, if so ordered by ENGINEER, proceed with the Work under the Contract Documents according to ENGINEER's direction and according to the decision on any appeal. The existence of a claim or protest shall not excuse CONTRACTOR from the requirements of the Contract Documents, including, but not limited to, the Contract Time.

16.6 APPEALS OF TERMINATION OR SUSPENSION

- A. Any decision of OWNER to terminate or suspend the Work shall not be subject to the provisions of this Part.

END OF DOCUMENT

SECTION 00 73 15
MODIFICATIONS TO APWA STANDARD PLANS
(Supplementary Conditions)

PART 1 GENERAL

1.1 DOCUMENT INCLUDES

A. This Document specifies changes to the Standard Plans published by the Utah Chapter of the American Public Works Association. Not all of these modifications will apply to the Work. CONTRACTOR is to apply the appropriate modification to the appropriate Standard Plan.

1.2 CHANGES

A. Modify the standard plans as follows.

Table 1 – WATER

APWA Standard Plan No.	Description	Modification
381	Trench backfill	Refer to Salt Lake City Public Utility (SLCPU) - Standard Practice #1. Maximum depth for magnetic marking tape is 18 inches.
382	Pipe zone backfill	Refer to SLCPU – Standard Practice #1 and notes given in Table 3 – Storm Drain.
502	27” frame & cover	Use smooth surface “waffle” pattern class 35 lid.
511	Fire hydrant	<ul style="list-style-type: none"> • Move the auxiliary valve to connect to the fitting at the fire hydrant. • If the pipe connecting to the main is greater than 16 feet, a second shutoff valve is required at the main.
521	3/4” & 1” meter	No material is to be backfilled inside meter box.
522-529	Various sized meters	See SLCPU standard drawings for Contractor checklist.
543		Not used
551	3/4” & 1” service taps	<ul style="list-style-type: none"> • Depth of service line is 48” minimum. • Tap will be at 10 or 2 o’clock position.
552	1-1/2” & 2” service taps	<ul style="list-style-type: none"> • B - 2-piece cast iron valve box with lid is required. • H – Type K–soft copper.
572	Detector check valve	<ul style="list-style-type: none"> • Fitting D will be MJ x flange • The extra gate valve located in the vault on the same side as the main supply pipeline is not required.
574	Cover collar	Concrete supports required under traffic box.
575	Air release valve	Not used – refer to SLCPU drawing. Use PVC piping above air released valve

Table 2 - SANITARY SEWER

Standard Plan No.	Description	Modification
381	Trench backfill	Refer to SLCPU - Standard Practice #1.
382	Pipe zone backfill	Refer to SLCPU - Standard Practice #1 and notes given in Table 3 – Storm Drain.
402	30” frame & cover	<ul style="list-style-type: none"> • Use smooth surface “waffle” pattern class 35 lid. • Low profile (1”) rings are not allowed.
411	Manhole	<ul style="list-style-type: none"> • 5-foot minimum manhole diameter required. • Eccentric manhole cones are not allowed. • Lateral connections directly to the manhole are not allowed. • Ramneck manhole section joint sealant and concrete grouting of manhole section joints is required.

		<ul style="list-style-type: none"> On precast manhole bases provide base with neoprene or rubber coupling system and stainless steel clamps
412	Invert cover	<ul style="list-style-type: none"> 2"x4" bracing only required at manholes with pipe entering above the mainline flowline. Normal manholes will have the invert cover supported by the manhole "shelf".
431	Sewer lateral connection	<ul style="list-style-type: none"> Prior Public Utilities approval and permit required for all lateral installations. Salt Lake City will provide and install wye. 24-hour notice required. Stainless steel straps required.
432	Sewer lateral relocation	<ul style="list-style-type: none"> Note 2- Salt Lake City will provide & install wye. Material under bottom of obstruction will be loosely compacted ¾" minus well graded granular material or sand. Flowable fill not allowed.
433	Pipe drop	Alternate 2- not used unless approved in writing by Public Utilities Chief Engineer.

Table 3 - STORM DRAIN

Standard Plan No.	Description	Modification
302	30" frame & cover	Use smooth surface "waffle" pattern class 35 lid.
303	44" frame & cover	Use smooth surface "waffle" pattern class 35 lid.
310	48" grate & frame	Not used
315	Catch basin	Note: CONTRACTOR to make back wall of box behind curb face opening as detailed.
316	Catch basin	Not used
320	Debris grate inlet	Not used
321	Automatic flap gate	Modify to include a clean-out box and lid over the flap gate.
361	Concrete grade rings	minimum height 6-1/2"
381	Trench backfill	Refer to SLCPU - Standard Practice #1.
382	Pipe zone backfill	<p>Refer to SLCPU - Standard Practice #1</p> <ul style="list-style-type: none"> Pipe zone material will be ¾" minus material. An exception may be granted for concrete pipe being installed below the water table. In these cases, the fill material below the pipe springline may be 2 inches minus sewer rock when approved in advance by the Chief Engineer. Sewer rock is not allowed with PVC and HDPE-N12 pipe. In all cases, backfill in the pipe zone above springline of pipe will be Grade ¾" minus material . The thickness of Type B – haunch material will be 6 inches below the outside diameter of the pipe.

PART 2 PRODUCT Not Used

PART 3 EXECUTION Not Used

END OF SECTION

DOCUMENT 00 73 50
REQUIREMENTS OF THE DEPARTMENT OF PUBLIC UTILITIES
(Supplementary Conditions)

PART 1 GENERAL

1.1 DOCUMENT INCLUDES

- A. Procedures for water line and sewer line construction.

1.2 RELATED WORK

- A. Salt Lake City's Department of Public Utilities has published a document entitled Standard Practices for Salt Lake City Public Utilities (most current edition). The document is available from 1530 South West Temple Street, Salt Lake City, Utah. In that publication there is a list of standard practices that apply to contractors.

- 1. The standard practices are as follows
 - a. Trench Backfill Requirements (No. 1).
 - b. Jordan and Salt Lake Canal Standards (No. 3).
 - c. Flushing and De-chlorination (No. 4).
 - d. Cable Installations (No. 8).
 - e. Water Service Kills (No. 9).
 - f. Commissioning Waterlines (No. 12).
 - g. Commissioning Large Service and Fire Lines (No. 13).
 - h. Hydrostatic Testing of Water Lines (No. 14).
 - i. Tree Pruning and Root Cutting (No. 15).
 - j. Raising Manholes, Cleanout and Water Valve Boxes (No. 16).
 - k. Standard Fire Hydrant Colors (No. 17).
 - l. Disinfection Large Water Connections (No. 18).
 - m. Waterline Installation in Hydrocarbon Contaminated Areas (No. 19).
- 2. Use the appropriate standard practice when doing work on sewer, water, and storm drain facilities that are owned by the City's Department of Public Utilities.

1.3 SUBMITTALS

- A. Prior to final payment, submit.
 - 1. All Contract Documents as required by Article 6.11 of Document 00 72 00 in the Manual of Standard Specifications.
 - 2. Water Service Work Performance Form. Use form at the end of this document.

PART 2 CHANGES TO THE APWA SPECIFICATIONS

2.1 SECTION 33 08 00 - COMMISSIONING OF WATER UTILITIES.

A. Add a new paragraph to Article 1.6

1.6 REFERENCES

A. AWWA C600, C602, and C606.

2.2 SECTION 33 08 00 – COMMISSIONING OF WATER UTILITIES.

A. Replace Article 3.3 with the following.

3.3 PRESSURE TEST AND DISINFECTION

- A. Prevent contamination from entering the line during storage, construction, or repairs. For new construction, keep a plug on the end of the pipe except for installing the next section of pipe.
- B. Disinfect the line by placing granular or tablet chlorine (10 to 25 mg/l concentration for 24 hours) in the line during installation and filling the line with water.
- C. De-chlorinate the line or dispose of chlorinated water in an acceptable manner and flush the line (see Standard practice No. 4 and the following paragraphs).
- D. Provide air release taps at pipeline's highest elevations and expel all air before test. Insert permanent plugs or air relief valves after test has been completed.
- E. Complete a hydrostatic test of the line according to AWWA for the type of pipe used (i.e. for ductile iron pipe; AWWA C600, PVC pipe AWWA C605). This will include connecting any external pump to the pipe and applying a hydrostatic pressure as established for the work by the Chief engineer. This will be at least 200 psi at the lowest point of the line. This pressure will be maintained within 5 psi for two hours (2 hrs.) and the amount of makeup water will be measured. The amount of makeup water must be less than 1.5 gallons and 2.2 gallons per 1,000 feet of pipe for eight inch (8") and 12 inch (12") pipe respectively. No piping installation will be accepted until the leakage is less than the amount listed above.
- F. Locate and repair defective joints and retest until leakage rate is less than allowable.
- G. Repair any noticeable leakage even if the total leakage is less than allowable.
- H. Flush after hydrostatic test and let the line sit for at least 16 hours before collecting a water sample.
- I. A representative of the Chief Engineer will collect and deliver a water sample to the City laboratory.
- J. Earliest test results may be available the next day.
- K. If the test passes, a second sample will be collected by the City representative and delivered to the City laboratory.
- L. If the first sample is bad, then the line will be flushed and allowed to sit in chlorinated state for 16 hours before another sample is collected.
- M. When two (2) acceptable samples have been obtained, the line is acceptable and

services can be connected.

2.3 SECTION 33 11 00 – WATER DISTRIBUTION AND TRANSMISSION.

A. Add a new paragraph to Article 2.1

2.1 PIPES AND FITTINGS

E. Provide Chevron fm #1 non-oxide grease and 8 mil polyethylene wrap.

B. Add a new paragraph to Article 3.4

3.4 INSTALLATION – PIPE AND FITTINGS

I. Coat all exposed nuts and bolts with Chevron fm #1 non-oxide grease and 8 mil polyethylene wrap.

2.4 SECTION 33 13 00 – DISINFECTION.

A. Add a new paragraph to Article 3.2

3.2 DISINFECTION OF WATER LINES

H. Refer to Article 3.3 of Section 33 08 00 – Commissioning of Water utilities as amended in Section 00 73 50.

END OF DOCUMENT

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DOCUMENT 00 91 13
ADDENDA

PART 1 GENERAL

1.1 PROCEDURE

- A. For filing purposes, add Addenda and Modifications to the Contract Documents following this page.
- B. All official Addenda and Modifications will be labeled, DOCUMENT 00 91 13.X, ADDENDUM NO. X

Any other document will not be considered as an Addendum for purposes of acknowledgement.

END OF DOCUMENT

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SECTION 01 11 00
SUMMARY OF WORK

PART 1 GENERAL

1.1 WORK COVERED BY CONTRACT DOCUMENTS

- A. Work of this Construction Contract. The work to be performed consists of furnishing and installing the equipment, facilities, services, and appurtenances indicated in the Contract Documents.

The location of the work is:
1805 West 500 South, Salt Lake City, Utah

- B. The construction contract for this tenant finish is being administered by Salt Lake City and is subject to Salt Lake City Standards.

1.2 CONTRACT METHOD

- A. Construct the Work under a single unit price contract.

1.3 COORDINATION WITH PROPERTY OWNERS – PUBLIC RELATIONS PLAN

- A. Maintaining good public relations with property owners and residents that use the streets affected by construction is an important component of this project. In order to maintain good public relations the Contractor shall prepare and employ a public relations plan. A written copy of the plan shall be prepared and presented to the City for approval at the pre-construction conference and shall address the following minimum requirements.

1. The CONTRACTOR shall provide a Public Relations Supervisor. The Public Relations Supervisor shall be responsible for interfacing with the public throughout the project and resolving complaints and concerns of property owners adjacent to the work. The name and resume of the proposed Public Relations Supervisor shall be presented to the ENGINEER at the pre-construction conference for approval. The Public Relations Supervisor shall:
 - a. have a 24-hour access phone number to respond to complaints.
 - b. have the authority to direct the work as required to resolve concerns and complaints;
 - c. provide an updated progress schedule to the ENGINEER on a weekly basis;
 - d. ensure all notification to adjacent property owners are made as described in the contract documents;
 - e. within 60 minutes of being notified, contact any property owners who have called with complaints or expressed concerns;
 - f. resolve all complaints and expressed concerns within 24 hours;
 - g. follow-up with individuals or entities making complaints 24 hours after resolution to ensure satisfactory results are obtained;
 - h. document all complaints in a public relations log, including name, address and contact information of individual or entity, date and time of initial notification,

nature of complaint, actions taken to resolve the complaint, date and time of complaint resolution, and date and time of follow-up actions; and

- i. provide a weekly copy of the public relations log to the ENGINEER of all complaints and actions taken to resolve them;
 - j. be listed with name and phone number on all project flyers, notifications, and project signs.
2. The CONTRACTOR shall provide a professionally prepared, movable temporary project sign at the work location of the project.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION

SECTION 01 31 13 COORDINATION

This specification changes a portion of APWA Standard Specification Section 01 31 13. All other provisions of the Section remain in full force and effect. This project is in Salt Lake City so it will be necessary to have a good coordination effort.

Add the following paragraph to Article 1.5 (page 100):

1.5 COORDINATION WITH ADJACENT PROPERTY OWNER

- F. 14-days prior to beginning work in any area and once each month during construction, hand deliver a written "**Construction Status Update Notice**" to all residents, businesses, schools and property owners adjacent to and affected by the Work. Notice shall be based on the template provided by the ENGINEER and be secured to door knob should occupants not be home. Obtain ENGINEER's final review of notice and distribution list/map prior to distribution. As a minimum the notice shall contain the following:
1. name and phone number of CONTRACTOR's representative for the project;
 2. name and phone number of Public Relations Supervisor
 3. name and phone number of OWNER's project manager
 4. work anticipated for the next 30 days including work locations and work by subcontractors and utility companies;
 5. rough estimate of construction schedule through end of work affecting area;
 6. anticipated impact to driveway approach access and closures;
 7. anticipated water, sewer or power outages;
 8. anticipated vehicular traffic impacts, rerouting or lane closures;
 9. anticipated pedestrian impacts and sidewalk closures;
 10. changes to public transportation bus routes; and
 11. any other construction or work items which will impact or restrict the normal use of streets and amenities.
- Failure to comply with this contract provision is considered grounds for project suspension per Article 15.1 of the General Conditions (APWA Document 00 72 00, page 71).
- G. CONTRACTOR shall notify all businesses affected by water shutdowns 72-hours in advance of the shutdown
- H. CONTRACTOR shall notify all residents affected by water shutdowns 48-hours in advance of the shutdown.

Add the following Article to Part 1 (page 100):

1.8 PUBLIC AGENCIES AND UTILITY PERSONNEL TO CONTACT

- A. Utility Companies: Utility companies generally require a minimum of 48 hours notice if their utility requires location, relocation or protection. Contact the following individuals to

coordinate. (Please note Contractor must contact **Blue Stakes** before digging, phone **(801) 208-2100**.)

2. Rocky Mountain Power Company:
3. Qwest CenturyLink:
 - a. Jeff Stapley: office (801) 974-8505; fax (801) 974-8192
 - b. Darren Keller: (801) 356-6975
 - c. Deanne Powell: (801) 974-8165
4. The Salt Lake City Department of Public Utilities: Nick Kryger, G.I.S. & IT Manager, (801) 483-6834 – Mapping Questions
5. The Salt Lake City Department of Public Utilities to schedule inspection and survey of project of installed sanitary sewer mains, storm drain mains, street lighting and water mains prior to backfilling fittings, valves, washouts, etc.: Call (801) 483-6727.
6. The Salt Lake City Department of Public Utilities Industrial Storm Program Coordinator, Greg Archuleta, (801) 483-6821
7. The Salt Lake City Department of Public Utilities Street Lighting Program Manager, David Pearson, (801) 483-6738
8. AT&T: Ken Howcroft, (801) 580-8005
9. Comcast (Cable TV): Gary Goldstein, (801) 401-3041; Kent Johnson (801) 401-3039; Eric Patten eric_patten@comcast.com; (801) 255-2711
10. Integra Telecom, Inc., (801) 924-3000; (801) 265-0928
11. Questar Infocomm, Inc.: Jeff Jerabek, (801) 324-1942
12. XO Communications:
- B. Salt Lake County Engineering Division: (385) 468-6600
- C. Salt Lake County Public Works Operations Division: Kevin Smeltzer (385) 468-6124; Brandon Johnson cell, (801) 557-9699; email brjohnson@slco.org a minimum of 48 hour prior to:
 1. Setting traffic barricades.
 2. Removal and relocation of traffic regulation, information signs and all striping modifications
- D. Salt Lake County Flood Control, Tim Beavers, (385) 468-6634
- E. Salt Lake County Dispatch – Non-Emergency: Notify 48 hour prior to street closure or water main work, (385) 468-6101.
 1. For both Unified Fire Authority and Unified Police Department of Great Salt Lake: (801) 743-7000.
- F. Emergency Services
 1. All affected emergency services shall be notified 48-hours prior to any street closures and/or water main work.
 - a. Unified Police Department of Greater Salt Lake (801) 743-7000

- b. Valley Emergency Call Center (VECC), phone (801) 840-4000 for Police, Fire, and Medical for Salt Lake City
 - c. Salt Lake City Police Department
- G. Salt Lake County Health Noise Ordinance – Sanitation and Safety, (385) 468-3835
- H. State of Utah (UDOT), Region 2 – Shane Safford, Encroachment and Permits Officer, (801) 975-4809, email lsafford@utah.gov, (801) 975-4979 fax.
- I. Utah Transit Authority: Dispatch, phone (801) 287-3202. UTA generally requires 72 hours notice if it becomes necessary to move bus stops or make scheduling changes
- J. Salt Lake City Urban Forester: Julie Fratto-Bardsley, (801) 972-7818, a minimum of 48 hours prior to removing trees.
- K. Salt Lake City Transportation Division: Mr. Scott Vaterlaus, (801) 535-6630, a minimum of 48 hours prior to:
 - 1. Setting traffic barricades.
 - 2. Removal and relocation of traffic regulation and information signs.
- L. Salt Lake City Public Safety Division: Notify 48 hours prior to street closure or water main work.
 - 1. Fire: Dispatch, (801) 799-3668
 - 2. Police: Dispatch, (801) 799-3000
- M. Salt Lake City Streets and Sanitation Division
 - 1. Neighborhood Cleanup Program: Cory Young, (801) 535-6920
- N. Salt Lake City Traffic Signal: Cabot Jennings, (801) 535-6994; (801) 910-5720, a minimum of 48 hours prior to have Traffic Detector Loops marked.
- O. Salt Lake City, City Engineer, (801) 535-6248, a minimum of 48 hours prior to street closure.

END OF SECTION

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SECTION 01 32 17
BASELINE AND PROGRESS SCHEDULES

PART 1 GENERAL

1.1 PURPOSE

- A. The OWNER is committed to delivering quality, cost-effective infrastructure to its customers in a timely manner. One of the most important tools the OWNER uses to achieve this goal is accurate, updated, current schedules for its capital projects. Accurate and updated schedules allow the OWNER to effectively track and manage its projects both in aggregate (at the program or OWNER-wide level) and project-by-project.
- B. The OWNER's goal is to take every reasonable step to ensure that projects finish on time and within budget. Project schedules are the fundamental building blocks to planning and executing projects efficiently and on time. These schedules are best prepared by those closest to the work. Because the vast majority of capital project delivery at the OWNER is performed by CONTRACTOR, it is critical that CONTRACTOR prepare schedules as part of performing their work for the OWNER.
- C. This Schedule Guidance Document is designed to guide CONTRACTOR in preparing and submitting acceptable schedules for use by the OWNER.

1.2 APPLICABILITY AND BASIC REQUIREMENTS

- A. CONTRACTOR is responsible for preparing schedules as defined herein and as required in their contracts. A waiver allowing a CONTRACTOR not to prepare a schedule in accordance with this Schedule Guidance Document may only be granted by the OWNER or designee.

There are three (3) basic elements to schedule submittals.

- 1. **Baseline Schedule:** Initial schedule submitted before work begins that will serve as the baseline for measuring progress and departures from the schedule. The Baseline Schedule is prepared by the CONTRACTOR at the beginning of the project and submitted to the OWNER for review and approval.
 - 2. **Progress Schedule:** Monthly submittal of a Progress Schedule documenting progress on the project and any changes anticipated. The Progress Schedule is prepared monthly by the CONTRACTOR and submitted to the OWNER.
 - 3. **Schedule Narrative:** Concise narrative that highlights changes in the schedule, expected delays, key schedule issues, etc., along with a cash flow graph or summary table. The Schedule Narrative is submitted to the OWNER monthly in conjunction with the Progress Schedule.
- B. The schedules required herein will be prepared using the following software (or saved down in the following version) in order to be compatible with the OWNER's schedule system, unless prior permission to use another software is requested and granted by the OWNER.
 - a. Primavera Project Planner (now owned by Oracle) version 8.2 or later
 - b. or Microsoft Project.

1.3 BASELINE SCHEDULE

A. General: The CONTRACTOR will develop a cost loaded schedule using the software version required in Section 1.2 and the Critical Path Method (CPM).

1. The OWNER will inform the CONTRACTOR of the Project Code (Project Number) for the Project. The file naming convention is demonstrated in the examples below.

- Baseline

Format. ProjectCode (project number)_DocumentType_Date_

Example. 1701_ScheduleBaseline_03162017.XER

- Monthly Update

Format. ProjectCode (project number)_DocumentType_Date_

Example. 1701_ScheduleUpdate_03162017.XER

- Monthly Schedule Narrative

Format. ProjectCode (project number)_DocumentType_Date_

Example. 1701_ScheduleNarrative_03162017.DOC

2. The approved Baseline Schedule is a part of the contract by reference. The CONTRACTOR has the sole responsibility to correct any latent defects in the Baseline Schedule and perform to the subsequently revised schedule.

3. The CONTRACTOR will use the Baseline Schedule to coordinate and monitor the work (including the activities of subcontractors, equipment vendors and suppliers).

4. The CONTRACTOR must keep a copy of the approved Baseline Schedule.

B. Schedule Work Breakdown Structure and Activities

1. **Work Breakdown Structure (WBS):** The OWNER's Work Breakdown Structure is designed to meet the basic reporting needs for the OWNER's financial and tracking systems. The CONTRACTOR's project-specific WBS should work within this basic framework and provide additional detail to efficiently deliver and track the work.

WBS elements that are definitely not a part of the scope of services need not be included in the schedule. Note that as many subtasks and activities as desired may be included underneath the WBS elements.

2. **Activities:** Activities are the discrete elements of work that make up the schedule. They should be organized underneath the umbrella of the WBS as described in Exhibit A.

The following information should be provided for each activity:

a. Activity ID Number

- Use a four-digit number left justified in the activity I.D. field.
- Alphanumeric activity numbers are NOT acceptable.

b. Activity Description

- Activity descriptions should adequately describe the activity and in some cases the extent of the activity. Examples of acceptable descriptions might include “install pipeline between Avenue A and Avenue B”, “water line route layout”, etc.).

c. Activity Durations

- The activity duration will be based upon the physical amount of work that is to be performed for the stated activity and are limited to 20 working days. If work is to exceed 20 days, then break the work down so the work will be completed within a 20-day time frame.
- The intent of this requirement is to ensure that the activities are segmented sufficiently to adequately track progress.

d. Activity Start and Finish Dates

- Activity start and finish dates will only be accepted if calculated by the software.
- Actual activity start and finish dates may not be assigned in a baseline. However, they must accurately be assigned in the working version of the schedule (see Section 4 Progress Schedule).

e. Activity Dependencies

All activities will be logically tied with a predecessor and a successor. The only exception to this rule will be for the project start and project finish milestones.

f. Milestone Activities

- The following milestone activities (i.e., important events on a project that mark critical points in time) are of particular interest to the OWNER and should be reflected in the Project Schedule for all phases of work, as applicable. Notice to Proceed (Construction)
- Draft Baseline Schedule submittal
- Preparation and submission of shop drawings, submittals, and any required re-submittals (if applicable)
- Mobilization
- Fabrication and delivery of equipment and materials (if applicable)
- Substantial Completion
- Construction Complete

C. Baseline Schedule Development: The CONTRACTOR will designate an authorized representative (Project Scheduler) responsible for developing and updating the schedule and preparing reports. It is recommended that a qualified scheduler develop the Baseline Schedule.

The CONTRACTOR’s initial schedule submittal will contain NO progress and represent the planned work for the duration of the project. Once approved by the OWNER, this schedule will become the baseline against which all future variance analysis will be performed.

The use of activity external constraint dates and lags on relationships is discouraged unless specified or approved by the OWNER. An example of an external constraint date is

“concrete placement will begin no later than January 1.” The reason for this requirement is that it creates an artificial (rather than calculated) critical path.

The Baseline Schedule will consider delivery lead times, construction and access constraints and the coordination of construction with OWNER operations.

1. **Safety Requirements:** Schedule performance should never take precedence over safety. Project schedules must allow work to be performed in a safe manner. The CONTRACTOR cannot reduce safety or worker protection in order to shorten schedules, recover lost time or accelerate the work.
2. **Inclement Weather:** Refer to climatology data for anticipating work that can be affected by inclement weather. Historical rain days can be reviewed from the following web site: <http://www.noaa.gov/climate>

D. Changes to Approved Baseline Schedule: The approved Baseline Schedule is the basis for measuring progress on the project (see Paragraph 1.4, Progress Schedule). As such, the CONTRACTOR should develop the Baseline Schedule considering the realistic delivery of the work tasks and likely constraints.

Total and free float is not for the exclusive use or benefit of either the OWNER or the CONTRACTOR, but is a resource available to both parties for the benefit of the project on a first needed basis. Changes to the Baseline Schedule will only be considered after all float has been consumed.

Changes to the approved Baseline Schedule may only be considered under limited circumstances. If warranted, any changes will require PRIOR approval by the ENGINEER’s Designee and OWNER’s Program Manager. Project circumstances that could be considered by the OWNER as potentially warranting re-baselining include the following:

- Change Orders to the contract affecting the scope of the work to be performed and the associated schedule completion date

1.4 **PROGRESS SCHEDULE**

As described in Paragraph 1.3, the Baseline Schedule is used to coordinate and monitor the work. The CONTRACTOR is required to keep a copy of the approved Baseline Schedule.

The Progress Schedule is simply a copy of the approved Baseline Schedule that will be statused monthly. In other words, progress on the project will be shown monthly as an update of the schedule that will be compared to the approved Baseline Schedule.

Note that the Progress Schedule will be statused (data date) through month end, although the submittal date must comply with Paragraph 1.6 of this section.

A. Progress Updates: The CONTRACTOR should show on the Progress Schedule updates of the following:

- The actual dates that activities start
- The actual dates that activities finish
- The remaining duration of activities in progress
- The percent complete of all activities on the schedule (0 percent to 100 percent complete)

B. Schedule Narrative: The Progress Schedule will be accompanied monthly by a concise Schedule Narrative that explains the submitted schedule. The purpose of the Schedule Narrative is to:

- Speed review time
- Explain variances from Baseline on critical path activities
- Explain to the OWNER logic changes and potential schedule conflicts related to dependences.
- Concisely summarize the projected cash flow for the project based on the stated schedule.

If the project is on schedule, and no significant issues related to schedule exist, then the Schedule Narrative is extremely brief. On the other hand, if the project is falling behind, and/or there are significant conflicts and obstacles to meeting the Baseline Schedule, then the Schedule Narrative should describe the issues and what steps will be necessary for the project to recover. Sharing this information ensures that the entire project team will be aware of the issues and have opportunity to assist, where applicable.

1.5 **ADDITIONAL GUIDANCE APPLICABLE TO CONSTRUCTION SCHEDULES ONLY**

In addition to the requirements in Sections 1.1 – 1.4 of this Schedule Guidance Document, the CONTRACTOR’s schedule will include the following.

A. Schedule of Value Pay Items: Schedule of Values Pay Items (Work) shall be loaded into the scheduling software using the labor, materials, and equipment resource types showing the quantity of Work to be done along with the corresponding value of the Work measured in dollars.

1.6 **SUBMITTAL OF SCHEDULES**

A. Submittal File Formats: Every time that a schedule or report is submitted (baseline and monthly progress) the following file formats are required.

1. **Baseline Schedule:** Submit the schedule in native file format (see below).

Also submit a .pdf of the bar chart schedule consisting of the following columns:

- Activity ID
- Activity Name
- Duration
- Start Date
- Finish Date
- Float
- Cost

2. **Progress Schedule:** Submit the schedule in native file format (see below).

Also submit a .pdf of the bar chart schedule consisting of the following columns:

- Activity ID
- Activity Name
- Physical Percent Complete
- Duration

- Start Date
 - Finish Date
 - Total Float
 - Remaining Total Cost
3. **Schedule Narrative:** Submit the schedule narrative in .doc format.
 4. **Native Schedule File Formats:** The native file structure is to save the schedule as follows:
 - a. In Primavera 6, save the file as an .XER file.
 - b. In Microsoft Project, save the file as an .MPP file.
- B. **Submittal Process:** All submittals of schedules must be made to the ENGINEER's Designee. Draft project Baseline Schedules must be submitted within thirty (30) calendar days after the formal Notice to Proceed from the OWNER. All schedules must be submitted in their native format (.XER file or .MPP) as well as in a PDF format. The OWNER will review, accept or reject the schedule within five (5) days of submittal. Once the Baseline Schedule has been accepted, Progress Schedule updates will be due monthly prior to the monthly progress meetings.

END OF SECTION

EXHIBIT A – OWNER WORK BREAKDOWN STRUCTURE

WBS shown in gray are reserved for the OWNER. WBS shown in blue are reserved for CONTRACTOR.

WBS Number	Name
1	Pre-Design
1.1	Project Planning & Development
1.2	Design Consultant Procurement
1.3	RFP Development
1.3.1	OWNER Review Process & Consultant Negotiations
1.3.2	Consultant Selection
2	Project Design
2.1	Survey and Geotechnical
2.2	Design
2.2.1	30% Design
2.2.2	60% Design
2.2.3	90% Design
2.3	Bid Documents
3	Bidding
3.1	Bid & Award
4	Contract
4.1	Contract Negotiation
5	Project Construction
5.1	Mobilization
5.2	Construction
5.2.1	Task 1
5.2.2	Task 2
5.2.3	Task 3
5.2.4	Task 4
5.2.5	Task 5
5.2.6	Task 6
5.2.7	Task 7
5.2.8	Task 8
5.2.9	Task 9
5.2.10	Task 10
5.3	Testing and Commissioning
5.4	Construction Services
6	Closeout
6.1	Closeout

EXHIBIT B – EXAMPLE SCHEDULES

SECTION 01 33 00 SUBMITTAL PROCEDURE

This specification changes a portion of APWA Standard Specification Section 01 33 00. All other provisions of the Section remain in full force and effect.

Add the following article to Part 1.

1.8 SUBMITTAL REGISTER

- A. List submittals required by Contract Documents on the attached Submittal Register form. Identify CONTRACTOR's need dates and ENGINEER's action dates.
- B. The following list identifies required submittal due dates. Submittals not identified in the list but specified in the Standard Specifications shall be submitted for information only.

When Due	Section Reference	Submittal
Pre-construction conference	01 33 00	Submittal Register
	00 72 00	Preliminary Progress Schedule
	00 72 00	Mobilization Plan
	00 72 00	Safety and Protection Plan
	00 72 00	Quality Control Program
Prior to Starting Work	00 73 10	Permits for Work
	01 55 26	Traffic Control Plan
	01 57 00	Storm Water Pollution Prevention Plan
	01 71 23	Surveyor's Name, Certificate of Assurance, License Number, Schedule of Values.
	32 01 93	Arborist's Certification and Registration Number
	32 01 93	Tree Protection Plan
Prior to Use	00 73 10	Written Permission to use Private Citizen's Property and Water
	31 05 13	Top Soil Supplier and Source Data
Prior to Delivery On Site	31 05 13	Common Fill
	32 11 23	Target Gradation Curve Crushed Aggregate
	32 12 05	Asphalt Concrete Mix Design Supplier's Mix Number.
Prior to Delivery On Site	03 30 04	Portland Cement Concrete Source Data and Supplier's Mix Number.
	33 11 00	Water System Product Data
Upon Delivery to Site	32 12 16	Asphalt Concrete Batch Delivery Ticket

When Due	Section Reference	Submittal
	03 30 10	Portland Cement Concrete Batch Delivery Ticket
Prior to Water Line Use	33 12 19	Water System Disinfection Report
Prior to System Use	33 08 00	Pipeline Commissioning
Prior to 1st Concrete Placement	03 30 10	Name, Certification Number and renewal date for all ACI Certified Finishers
	03 30 10	Portland Cement Concrete Curing Compound Source, Type, and Data
Daily as applicable	03 30 04	Portland Cement Concrete Quality Control Test Reports
	03 30 10	
With Each Monthly Pay Request	01 32 16	Progress Schedule, Survey Schedule of Values
5 Working Days Prior to Substantial Completion	01 78 50	Certification of Compliance and Request for Final Inspection
Prior to Final Payment	01 71 23 01 71 24 31 05 10	Land Survey Closeout Documentation of Unclassified Excavation Calculations
	01 78 50	Evidence of Payment to Suppliers and Sub-contractors
	01 78 39	Redlines
	01 78 39	Water Line Commissioning Test Reports

NOTES:

1. Section references listed in this table that are not found in the Project Manual may be found in the APWA Standard Specifications.

END OF SECTION

SUBMITTAL REGISTER

PROJECT TITLE: _____
 LOCATION: _____ Job No. _____
 CONTRACTOR: _____

SCHEDULED ACTIVITY	SUBMITTAL ITEM No.	SPECIFICATION PARAGRAPH No.	DESCRIPTION OF MATERIAL	TYPE OF SUBMITTAL										REVIEW ACTION	CONTRACTOR NEED DATES			ENGINEER ACTION DATES		OTHER			
				SAMPLES	SHOP DRAWINGS	PARTS LIST	PRODUCT DATA	DESIGN DATA	SPECIFICAIONS	CERTIFICATIONS	INSTRUCTIONS	O&M MANUAL	OTHER	REVIEW REQUIRED BY	SUBMITTAL DATE	APPROVAL NEEDED BY	MATERIAL NEEDED BY	DATE RECEIVED	ACTION CODE				

INSTRUCTIONS

GENERAL

1. **CONTRACTOR to Complete Form:** Review the Contract Documents to insure completeness. Expand general category listings. Show individual entries on this form for each item.
 - a. As an example, a general category would be "Plumbing Fixtures" which the CONTRACTOR is to breakdown into individual entries such as "Toilet P-1, Lavatory P-2, etc.". Complete the Submittal Register, and submit it to ENGINEER.
2. **Resubmittals:** If a submittal is returned for correction, provide a new Submittal Identification Number. Identify the number on the submittal register and resubmit the information for review. Do not amend the data already contained on the submittal register.

SUBMITTAL REGISTER

1. **SCHEDULED ACTIVITY:** If an activity on the Progress Schedule is assigned to the submittal, place the schedule activity number in the "SCHEDULED ACTIVITY" column.
2. **SUBMITTAL ITEM No.:** Assign to each entry on the Submittal Register a sequential number in the "SUBMITTAL IDENTIFICATION (ITEM NUMBER)" column.
3. **REVIEW ACTION:** The "REVIEW ACTION" column identifies technical review responsibility of submittal. Review of all products and materials is the CONTRACTOR's responsibility; however, certain specified submittals will also require ENGINEER's review.
 - a. If REVIEW ACTION Column is Blank: Identified submittal shall be approved by the CONTRACTOR and then submitted to the ENGINEER for information.
 - b. If the "ENGINEER" is Identified in the REVIEW ACTION Column: Identified submittals shall be first approved by the CONTRACTOR and then submitted to the ENGINEER for review.
4. **ENGINEER ACTION DATES:** This column is for ENGINEER's use to record date submittal was received and the action code assigned in the submittal review process.

DOCUMENT 01 35 24
CONTRACTORS CERTIFICATION OF
COMPLIANCE TO SAFETY PLAN

PART 1 GENERAL

1.1 CONTRACTORS CERTIFICATION

1. The Contractor will certify that he will comply with the Safety and Protection Plan requirements of the City. A letter from the Contractor describing the hazards present on this project and his plan to mitigate those hazards is attached following this page.

END OF DOCUMENT

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SECTION 01 45 00

QUALITY CONTROL

This specification changes a portion of APWA Standard Specification Section 01 45 00. All other provisions of the Section remain in full force and effect.

Add the following Article to Part 1.

1.8 QUALITY CONTROL PROGRAM

- A. Quality Control Program:** Provide a quality control program which includes procedures and organization so equipment, workmanship, fabrication, construction, operations, and inspections comply with the Contract Documents.
- B. Quality Control Program Manager Qualifications:**
 - 1. Not CONTRACTOR's work or site superintendent.
 - 2. Quality control experience with projects of similar type and magnitude.
 - 3. Authorized as CONTRACTOR's representative for all quality control and quality assurance matters.
- C. Quality Control Program Manager Responsibilities:**
 - 1. Manage and supervise quality control plan and quality control surveillance personnel.
 - 2. Verify that testing procedures comply with contract requirements.
 - 3. Verify that facilities and testing equipment are available and comply with testing standards.
 - 4. Check test instrument calibration data against certified standards.
 - 5. Verify that recording forms, including all the documentation requirements, have been prepared.
 - 6. Prepare copies of each test result with all necessary data recorded and with documentation and computations compiled.
 - 7. Provide more testing, if, in ENGINEER's opinion, work is not being adequately controlled.
 - 8. Immediately report any non-compliance of materials and mixes to ENGINEER and CONTRACTOR.
 - 9. When an out-of-tolerance condition exists, perform additional control testing until tolerance is attained.
 - 10. Correlate CONTRACTOR's assurance testing program (APWA Section 01 43 00) with ENGINEER's acceptance testing program (APWA Section 01 45 00).

END OF SECTION

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SECTION 01 55 26

TRAFFIC CONTROL

This specification changes a portion of APWA Standard Specification Section 01 55 26. All other provisions of the Section remain in full force and effect.

Change paragraph 1.2 D. to read as follows.

1.2 REFERENCES

- D. Manual on Uniform Traffic Control Devices for Streets and Highways published by the American Traffic Safety Services Association (ATSSA), 15 Riverside Parkway, Suite 100, Fredericksburg, Virginia, 22406-1717, U.S. Department of Transportation Federal Highway Administration, 2009 Edition of MUTCD.

END OF SECTION

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SECTION 01 57 00 TEMPORARY CONTROLS

This specification changes a portion of APWA Standard Specification Section 01 57 00. All other provisions of the Section remain in full force and effect.

Add the following paragraph to Article 3.2 DUST AND MUD CONTROL:

- D. At a minimum, dust and mud control efforts shall include a twice daily sweeping of the work area streets. One sweeping shall take place midway through the work day and the second shall take place at the end of the work day. Additional efforts may be required as determined by the Engineer.

END OF SECTION

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SECTION 01 58 00
PROJECT IDENTIFICATION AND SIGNS

PART 1 GENERAL

1.1 SECTION INCLUDED

- A. Temporary on-site identification and informational signs to identify key elements of construction facilities and traffic routing.

1.2 SUBMITTALS

- A. Sketch of informational signs.

1.3 QUALITY ASSURANCE

- A. Sign Painter: Professional experienced in type of work required.
- B. Finishes, Painting: Adequate to resist weathering and fading for scheduled construction period.

PART 2 PRODUCTS

2.1 SIGN MATERIALS

- A. Structure and Framing: May be new or used, wood or metal, in sound condition, structurally adequate to work and suitable for specified finish.
- B. Sign Surfaces: Exterior grade plywood
 - 1. Type 4'x4': 4-feet high by 4-feet wide
 - 2. Type 4'x8': 4-feet high by 8-feet wide
 - 3. Thickness: As required by standards to span framing members, resist wind loading, and to provide an eve, smooth surface without waves or buckles.
- C. Rough Hardware: Galvanized steel or equal.
- D. Paint: Exterior quality
 - 1. Background: White
 - 2. Lettering: Black
 - 3. Accents: Green

PART 3 EXECUTION

3.1 PROJECT IDENTIFICATION SIGNS

- A. Content to include:
 - 1. Title of Project
 - 2. City logo and motto
 - 3. Name of Mayor
 - 4. Names of City Council members and the district they represent
 - 5. Names of professional consultants and their titles
 - 6. Name of ENGINEER and title
 - 7. Name of CONTRACTOR
- B. Graphic design, style of lettering, colors: See Drawing
- C. Paint exposed surfaces of supports, framing, and surface material; one coat of primer and one coat of exterior paint.

- D. Erect on the site at a lighted location of high public visibility, adjacent to the main entrance to the site, as approved by ENGINEER.

3.2 **INFORMATIONAL SIGNS**

- A. Size of signs and lettering: As required by regulatory agencies, or as appropriate to usage.
- B. Colors: As required by regulatory agencies, otherwise of uniform colors throughout project.
- C. Paint exposed surfaces: One coat of primer, and one coat of exterior paint.
- D. Paint graphics in styles, sizes, and colors selected.
- E. Install at a height for optimum visibility, on ground-mounted poles, or attached to temporary structural surfaces.

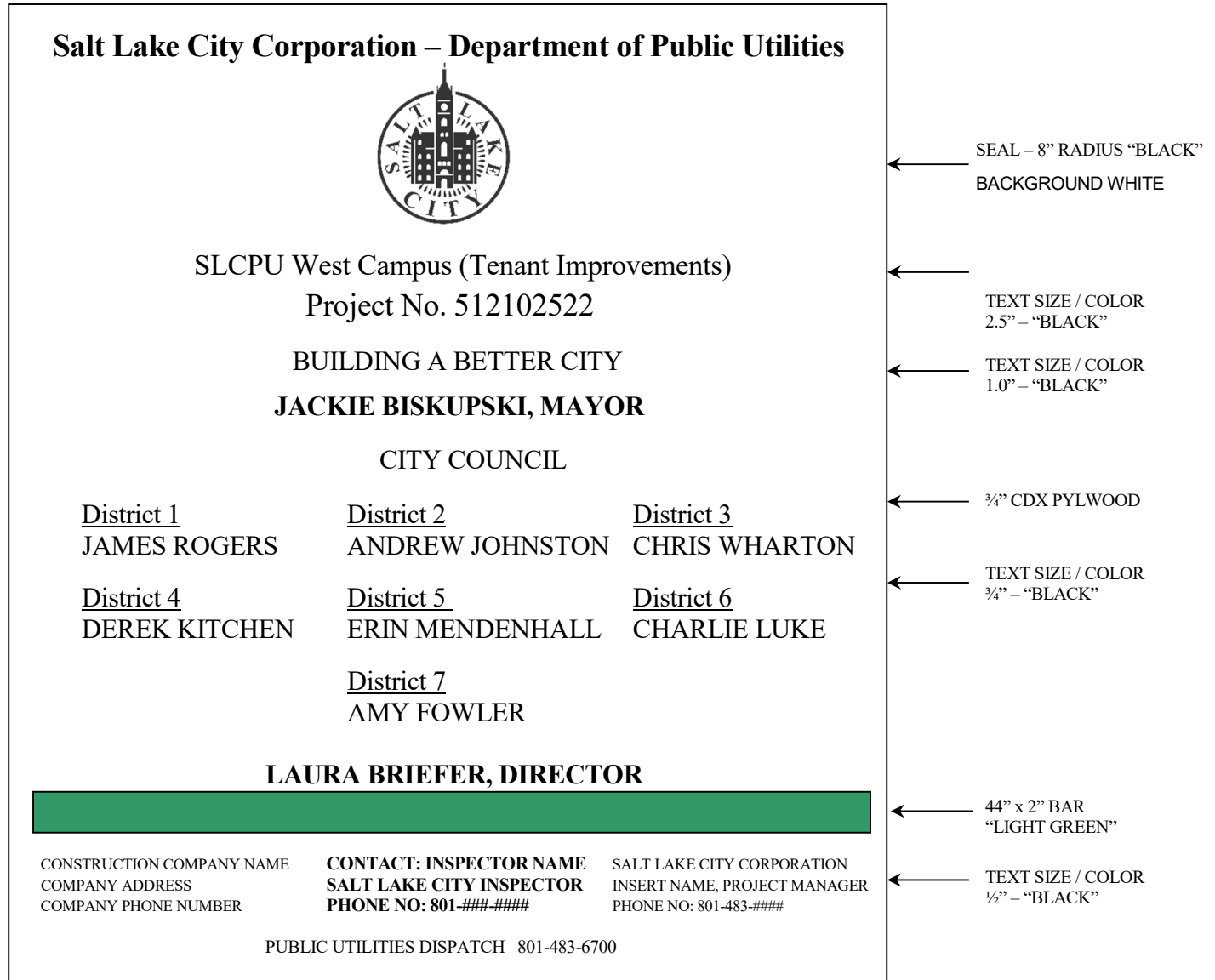
3.3 **MAINTENANCE**

- A. Maintain signs and supports in a neat, clean condition; repair damages to structure, framing, or sign.
- B. Relocate information signs, as required by progress of the Work.
- C. Remove graffiti from signs immediately.

3.4 **REMOVAL**

- A. Remove signs, framing, supports, and foundations at completion of Project.
- B. Repair landscaping, and surface improvements damaged by removal.

PROJECT IDENTIFICATION SIGN USE WITHIN SALT LAKE CITY LIMITS



4' x 4' PROJECT SIGN ATTACHED TO WOODEN OR METAL POSTS

NOTE: SEE APWA SPECIFICATION 01 58 00 FOR DETAILED INFORMATION REGARDING PROJECT SIGNS.

END OF SECTION

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SECTION 01 71 13 MOBILIZATION AND DEMOBILIZATION

This specification changes a portion of APWA Standard Specification Section 01 71 13. All other provisions of the Section remain in full force and effect.

Add the following paragraph:

1.4 SUBMITTALS

- A. Project Videotape: Videotape the project area prior to commencing construction. The Engineer shall be present during taping. The taping shall be performed on foot, noting all salient existing features in the project area and the location of the taping shall be clearly indicated. "Drive-by" video tapes will not be accepted. The original video tape shall be submitted to the ENGINEER a minimum of 5 days prior to starting construction.

END OF SECTION

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SECTION 02 08 00
UTILITY MATERIALS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Manufactured units and components for utility services.

1.2 REFERENCES

- A. American Public Works Association (Utah Chapter).
1. APWA 01 25 00: Product Options and Substitutions.
 2. APWA Publication: Manual of Standard Plans.

PART 2 PRODUCTS

2.1 MANUFACTURED UNITS

A. Provide products specified in the following tables. No substitutions permitted without ENGINEER's written approval (see paragraph 6.4 of Document 00 72 00 GENERAL CONDITIONS):

Table 1 – WATER

STD PLAN #	<i>DESCRIPTION</i>	<i>PART NUMBER</i>
All	Main line pipe material	<ul style="list-style-type: none"> • Ductile iron -- class 52 cement mortar lined • PVC -- SDR 18 (C-900) diameters 8" to 18", C-905 and C-909 Note: Other materials can be used only after approval by Chief Engineer.
All	Service line pipe material	Type K soft copper
502	27" Frame and cover -- smooth surface "waffle" pattern	D&L A-1005, Olympic MHU-1000
503	38" Frame and double cover -- smooth surface "waffle" pattern Notes: (1) Valves larger than 16" require larger ring and cover. Size will be specified by Chief Engineer. (2) Contractor to provide 1" diameter lifting hole and pry notch in larger lids.	D&L A-1426

511	Hydrant	Mueller Centurion (A-423), M & H 129 (SLC Specs) Clow 2500, Clow Medallion, Waterous WB-67
511	Two piece cast iron valve box (screw type)	Tyler 6850, D&L M-9042, Olympic VBU-8310
511	Two piece cast iron valve box (slip type)	D&L M-8042, Olympic VBU-8210, Tyler 6855
511	Gate valve	Resilient seat gate valve AWWA C509 NRS
511, 552, 574	Ductile iron traffic box	Spanish Fork Foundry SVB 090 D&L M-9009
521	Meter box cover	Ford X32 Tyler 6150 with 1-1/32" bronze bolt
521	Meter box (notched out)	Rigid PVC Corrugated Polyethylene AMCO 1830 WMB concrete
521	3/4" meter setter	Mueller B-2404 with tie bar – 21" riser Ford VB-73-21W-11-33
521	1" meter setter	Mueller B-2404 with tie bar – 21" riser Ford VB-74-21W -11-44
521	Meter insulation	Ford meter pit insulation blanket
523, 525, 529	Top section of valve box with lid	D&L M-80 series
551	Corporation stop	Mueller H-15000 Ford F600
551	Service saddle for DI pipe	Ford 202B
551	Service saddle for PVC and AC pipe	ROMAC 202N
552	Two piece cast iron valve box	Tyler 6870 D&L M-9145
552	Locking compression adapter Or	Mueller H-15428 Ford C84-66-G (1-1/2")

	Brass copper flared male adapter	Ford C84-77-G (2") Mueller H-15425 Ford C28-66 (1-1/2") Ford C28-77 (2")
552	Ball valve corp. stop	Ford B81-666 (1-1/2") Ford B81-777 (2")
552	Service Saddle (double strap)	Ford 202B Romac 202N
572	Gate valve (MJ x flange)	Gate valve AWWA C509 NRS
572	Detector check valve	Hersey Model DC

Table 2 - SANITARY SEWER

STD PLAN #	DESCRIPTION	PART NUMBER
All	Pipe Materials	Reinforced Concrete -- class III (18" through 96") Non-reinforced Concrete -- class 3 (8" through 15") PVC -- SDR 35 (4" through 27") Notes: (1) Other materials can be used only after approval by Chief Engineer. (2) Special concrete mix may require a poly lining for additional protection for concrete pipe from hydrogen sulfide (H ₂ S) gas may be required. (3) Rubber O-ring gaskets as per ASTM C-433.
402	30" Frame and cover -- smooth surface "waffle" pattern	D&L Supply A-1180, Olympic MHU-1060
402	Special Lid	D&L Supply A-1181, Olympic MHU-1070 Note: Required if surface water can enter manhole.
411	5' diameter pre-cast concrete manhole bases	Prior approval by Chief Engineer required.
411	Manhole section joint sealant	Ramneck Note: Concrete grouting of manhole section joints is additionally required.
411	Manhole gaskets	Elastomeric rubber (ASTM C 443)

411	Manhole adapter/water stop gasket	Romac LCT
431	Pipe coupling	Fernco neoprene couplings, adapter, bushings
431	Inline integral wye fittings	Factory fabricated
431	Lateral connections Note: For connections to 18” and larger sewer mains only.	Inserta Tee

Table 3 - STORM DRAIN

STD PLAN #	DESCRIPTION	PART NUMBER
All	Pipe materials	Reinforced Concrete -- class III HDPE-N12 pipe Note: Other materials can be used only after approval by Chief Engineer.
302	30" Frame and cover -- smooth surface "waffle" pattern	D&L Supply A-1180 (vented) D&L Supply A-1181 (solid) Olympic MHU-1060 & MHU-1070
303	44" Frame and cover -- smooth surface "waffle" pattern	D&L Supply A-1460,
304	48" Cover and frame -- smooth surface "waffle" pattern	D&L Supply H-1801,
305	51" Cover and frame -- smooth surface "waffle" pattern	D&L Supply H-1810
308	Grate and frame with adjustable curb box	D&L Supply I-3518
309	47-3/4" Grate and frame	D&L Supply I-1803
321	Automatic flap gate	

PART 3 EXECUTION

3.1 METERS

- A. ¾-inch and 1-inch meters are provided and installed by Salt Lake City's Public Utilities Department.
- B. For meter installations greater than 1-inch, Salt Lake City's Public Utilities Department will provide the meter and bypass assembly for installation by the CONTRACTOR.

END OF SECTION

SECTION 03 30 00
CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Concrete formwork.
- B. Floors and slabs on grade.
- C. Concrete reinforcement.
- D. Joint devices associated with concrete work.
- E. Concrete curing.

1.02 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements and installation instructions.
- C. Mix Design: Submit proposed concrete mix design.

PART 2 PRODUCTS

2.01 FORMWORK

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

2.02 REINFORCEMENT

- A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi).
 - 1. Type: Deformed billet-steel bars.
 - 2. Finish: Galvanized in accordance with ASTM A767/A767M, Class I, unless otherwise indicated.
- B. Steel Welded Wire Reinforcement (WWR): Galvanized, plain type, ASTM A1064/A1064M.
 - 1. WWR Style: 4 x 8-W6 x W10.
- C. Reinforcement Accessories:
 - 1. Tie Wire: Annealed, minimum 16 gage, 0.0508 inch.

2.03 CONCRETE MATERIALS

- A. Cement: ASTM C150/C150M, Type I - Normal Portland type.
- B. Fine and Coarse Aggregates: ASTM C 33.
- C. Water: Clean and not detrimental to concrete.

2.04 BONDING AND JOINTING PRODUCTS

2.05 CONCRETE MIX DESIGN

- A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.
- B. Normal Weight Concrete:
 - 1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: 4,000 pounds per square inch.
 - 2. Maximum Slump: 3 inches.
 - 3. Maximum Aggregate Size: 5/8 inch.

2.06 MIXING

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

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 PREPARATION

- A. Formwork: Comply with requirements of ACI 301. Design and fabricate forms to support all applied loads until concrete is cured, and for easy removal without damage to concrete.
- B. Verify that forms are clean and free of rust before applying release agent.
- C. Coordinate placement of embedded items with erection of concrete formwork and placement of form accessories.

3.03 INSTALLING REINFORCEMENT AND OTHER EMBEDDED ITEMS

- A. Comply with requirements of ACI 301. Clean reinforcement of loose rust and mill scale, and accurately position, support, and secure in place to achieve not less than minimum concrete coverage required for protection.
- B. Install welded wire reinforcement in maximum possible lengths, and offset end laps in both directions. Splice laps with tie wire.

3.04 PLACING CONCRETE

- A. Place concrete in accordance with ACI 304R.

3.05 CONCRETE FINISHING

3.06 CURING AND PROTECTION

- A. Comply with requirements of ACI 308R. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
- B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
 - 1. Normal concrete: Not less than 7 days.

3.07 PROTECTION

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

END OF SECTION 03 30 00

**SECTION 06 20 00
FINISH CARPENTRY**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Finish carpentry items.
- B. Hardware and attachment accessories.

1.02 RELATED REQUIREMENTS

N/A

1.03 REFERENCE STANDARDS

- A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; current edition.
- B. ANSI A135.4 - American National Standard for Basic Hardboard; 2012.
- C. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test; 2015.
- D. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014.
- E. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 3.0; 2016.
- F. BHMA A156.9 - American National Standard for Cabinet Hardware; 2015.
- G. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the work with plumbing rough-in, electrical rough-in, installation of associated and adjacent components.

1.05 SUBMITTALS

- A. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
 - 1. Provide the information required by AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS).
 - 2. Include certification program label.

1.06 QUALITY ASSURANCE

- A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.
 - 1. Accredited participant in the specified certification program prior to the commencement of fabrication and throughout the duration of the project.
- B. Quality Certification:
 - 1. Provide designated labels on shop drawings as required by certification program.
 - 2. Provide designated labels on installed products as required by certification program.
 - 3. Submit certifications upon completion of installation that verifies this work is in compliance with specified requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Protect work from moisture damage.

PART 2 PRODUCTS

2.01 FINISH CARPENTRY ITEMS

- A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.

2.02 WOOD-BASED COMPONENTS

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

2.03 SHEET MATERIALS

- A. Hardboard: ANSI A135.4; Pressed wood fiber with resin binder, Class 1 - Tempered, 1/4 inch thick, smooth one side (S1S).
- B. Pegboard: Pressed wood fiber with resin binder, standard grade; 1/8 inch thick, with holes spaced at 1 inch on center in both directions.

2.04 PLASTIC LAMINATE MATERIALS

- A. Plastic Laminate: NEMA LD 3, HGS; textured, low gloss finish.
- B. Laminate Adhesive: Type recommended by laminate manufacturer to suit application; not containing formaldehyde or other volatile organic compounds.

2.05 FASTENINGS

- A. Adhesive for Purposes Other Than Laminate Installation: Suitable for the purpose; not containing formaldehyde or other volatile organic compounds.

2.06 ACCESSORIES

- A. Lumber for Shimming and Blocking: Softwood lumber of acceptable species.
- B. Plastic Edge Trim: Extruded convex shaped; smooth finish; self locking serrated tongue; of width to match component thickness; as selected color.
- C. Safety Glass: Laminated glass complying with 16 CFR 1201 and ANSI Z97.1; clear; nominally 6 mm thick.
- D. Primer: Alkyd primer sealer.

2.07 HARDWARE

- A. Hardware: Comply with BHMA A156.9.

2.08 FABRICATION

- A. Shop assemble work for delivery to site, permitting passage through building openings.
- B. Cap exposed plastic laminate finish edges with plastic trim.
- C. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.
- D. Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arises. Locate counter butt joints minimum 2 feet from sink cut-outs.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify adequacy of backing and support framing.
- B. Verify mechanical, electrical, and building items affecting work of this section are placed and ready to receive this work.

3.02 INSTALLATION

- A. Install work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade indicated.
- B. Set and secure materials and components in place, plumb and level.
- C. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.
- D. Install hardware in accordance with manufacturer's written instructions.

3.03 TOLERANCES

- A. Maximum Variation from True Position: 1/16 inch.
- B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch.

END OF SECTION 06 20 00

SECTION 06 83 16
FIBERGLASS REINFORCED PANELING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fiberglass reinforced plastic panels.
- B. Trim.

1.02 REFERENCE STANDARDS

- A. ASTM D5319 - Standard Specification for Glass-Fiber Reinforced Polyester Wall and Ceiling Panels; 2012.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2016.

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.
- C. Samples: Submit two samples 6 by 6 inch in size illustrating material and surface design of panels.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Store panels flat, indoors, on a clean, dry surface. Remove packaging and allow panels to acclimate to room temperature for 48 hours prior to installation.

PART 2 PRODUCTS

2.01 PANEL SYSTEMS

- A. Wall Panels:
 - 1. Panel Size: 4 by 8 feet.
 - 2. Panel Thickness: 0.10 inch.
 - 3. Surface Design: Embossed.
 - 4. Color: White.
 - 5. Attachment Method: Adhesive only, sealant joints, no trim.

2.02 MATERIALS

- A. Panels: Fiberglass reinforced plastic (FRP), complying with ASTM D5319.
 - 1. Surface Burning Characteristics: Maximum flame spread index of 25 and smoke developed index of 450; when system tested in accordance with ASTM E84.
- B. Trim: Vinyl; color coordinating with panel.
- C. Sealant: Type recommended by panel manufacturer; white.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions and substrate flatness before starting work.
- B. Verify that substrate conditions are ready to receive the work of this section.

3.02 INSTALLATION - WALLS

- A. Install panels in accordance with manufacturer's instructions.
- B. Cut and drill panels with carbide tipped saw blades, drill bits, or snips.
- C. Apply adhesive to the back side of the panel using trowel as recommended by adhesive manufacturer.
- D. Apply panels to wall with seams plumb and pattern aligned with adjoining panels.

- E. Install panels with manufacturer's recommended gap for panel field and corner joints.
- F. Place trim on panel before fastening edges, as required.
- G. Fill channels in trim with sealant before attaching to panel.
- H. Install trim with adhesive and screws or nails, as required.
- I. Seal gaps at floor, ceiling, and between panels with applicable sealant to prevent moisture intrusion.
- J. Remove excess sealant after paneling is installed and prior to curing.

END OF SECTION 06 83 16

SECTION 07 21 00
THERMAL INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Batt insulation and vapor retarder in exterior wall construction.
- B. Batt insulation for filling perimeter window and door shim spaces and crevices in exterior wall and roof.

1.02 REFERENCE STANDARDS

- A. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2012.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2016.
- C. ASTM E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace At 750 Degrees C; 2016.

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.

1.04 FIELD CONDITIONS

- A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

PART 2 PRODUCTS

2.01 APPLICATIONS

- A. Insulation in Metal Framed Walls: Batt insulation with integral vapor retarder.

2.02 BATT INSULATION MATERIALS

- A. Where batt insulation is indicated, either glass fiber or mineral fiber batt insulation may be used, at Contractor's option.
- B. Glass Fiber Batt Insulation: Flexible preformed batt or blanket, complying with ASTM C665; friction fit.
 - 1. Flame Spread Index: 75 or less, when tested in accordance with ASTM E84.
 - 2. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
 - 3. Combustibility: Non-combustible, when tested in accordance with ASTM E136, except for facing, if any.
 - 4. Formaldehyde Content: Zero.
 - 5. Thickness: 4 inch.
 - 6. Facing: Aluminum foil, flame spread 25 rated; one side.
- C. Mineral Fiber Batt Insulation: Flexible or semi-rigid preformed batt or blanket, complying with ASTM C665; friction fit; unfaced flame spread index of 0 (zero) when tested in accordance with ASTM E84.
 - 1. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
 - 2. Smoke Developed Index: 0 (zero), when tested in accordance with ASTM E84.
 - 3. Thickness: 4 inch.

2.03 ACCESSORIES

- A. Tape: Bright aluminum self-adhering type, mesh reinforced, 2 inch wide.
- B. Nails or Staples: Steel wire; electroplated or galvanized; type and size to suit application.

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 BATT INSTALLATION

- A. Install insulation and vapor retarder in accordance with manufacturer's instructions.
- B. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
- C. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.

3.04 PROTECTION

- A. Do not permit installed insulation to be damaged prior to its concealment.

END OF SECTION 07 21 00

SECTION 07 62 00
SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fabricated sheet metal items, including flashings, counterflashings, gutters, downspouts, and other items noted.
- B. Sealants for joints within sheet metal fabrications.

1.02 REFERENCE STANDARDS

- A. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2013.
- B. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- C. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric); 2014.
- D. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014a.
- E. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free; 2007 (Reapproved 2012).
- F. CDA A4050 - Copper in Architecture - Handbook; current edition.
- G. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

1.03 SUBMITTALS

- A. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.

1.04 QUALITY ASSURANCE

- A. Perform work in accordance with SMACNA (ASMM) and CDA A4050 requirements and standard details, except as otherwise indicated.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
- B. Prevent contact with materials that could cause discoloration or staining.

PART 2 PRODUCTS

2.01 SHEET MATERIALS

- A. Pre-Finished Aluminum: ASTM B209 (ASTM B209M); 20 gage, (0.032 inch) thick; plain finish shop pre-coated with modified silicone coating.
 - 1. Fluoropolymer Coating: High Performance Organic Finish, AAMA 2604; multiple coat, thermally cured fluoropolymer finish system.
 - 2. Color: As selected by Architect from manufacturer's standard colors.

2.02 FABRICATION

- A. Form sections true to shape, accurate in size, square, and free from distortion or defects.
- B. Form pieces in longest possible lengths.
- C. Hem exposed edges on underside 1/2 inch; miter and seam corners.
- D. Form material with flat lock seams, except where otherwise indicated; at moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.
- E. Fabricate corners from one piece with minimum 18 inch long legs; seam for rigidity, seal with sealant.

2.03 GUTTER AND DOWNSPOUT FABRICATION

- A. Gutters: SMACNA (ASMM), Rectangular profile.
- B. Downspouts: Rectangular profile.
- C. Gutters and Downspouts: Size for rainfall intensity determined by a storm occurrence of 1 in 10 years in accordance with SMACNA (ASMM).
- D. Accessories: Profiled to suit gutters and downspouts.
 - 1. Anchorage Devices: In accordance with SMACNA (ASMM) requirements.
 - 2. Gutter Supports: Brackets.
 - 3. Downspout Supports: Brackets.
- E. Splash Pads: Precast concrete type, of size and profiles indicated; minimum 3000 psi at 28 days, with minimum 5 percent air entrainment.
- F. Seal metal joints.

2.04 ACCESSORIES

- A. Fasteners: Galvanized steel, with soft neoprene washers.
- B. Primer: Zinc chromate type.
- C. Concealed Sealants: Non-curing butyl sealant.
- D. Exposed Sealants: ASTM C920; elastomeric sealant, with minimum movement capability as recommended by manufacturer for substrates to be sealed; color to match adjacent material.
- E. Plastic Cement: ASTM D4586/D4586M, Type I.

PART 3 EXECUTION

3.01 PREPARATION

- A. Install starter and edge strips, and cleats before starting installation.
- B. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil.

3.02 INSTALLATION

- A. Secure flashings in place using concealed fasteners, and use exposed fasteners only where permitted..
- B. Apply plastic cement compound between metal flashings and felt flashings.
- C. Fit flashings tight in place; make corners square, surfaces true and straight in planes, and lines accurate to profiles.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for field inspection requirements.
- B. Inspection will involve surveillance of work during installation to ascertain compliance with specified requirements.

END OF SECTION 07 62 00

SECTION 07 92 00
JOINT SEALANTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Nonsag gunnable joint sealants.

1.02 REFERENCE STANDARDS

- A. ASTM C834 - Standard Specification for Latex Sealants; 2014.
- B. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014a.
- C. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016.
- D. SCAQMD 1168 - South Coast Air Quality Management District Rule No.1168; current edition.

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data for Accessory Products: Submit manufacturer's technical data sheet for each product to be used, including physical characteristics, installation instructions, and recommended tools.
- C. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.

1.04 WARRANTY

- A. Correct defective work within a five year period after Date of Substantial Completion.
- B. Warranty: Include coverage for installed sealants and accessories that fail to achieve watertight seal , exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.01 JOINT SEALANT APPLICATIONS

- A. Scope:
 - 1. Interior Joints: Do not seal interior joints unless specifically indicated to be sealed. Interior joints to be sealed include, but are not limited to, the following items.
 - a. Joints between door, window, and other frames and adjacent construction.
 - 2. Do not seal the following types of joints.
 - a. Joints indicated to be treated with manufactured expansion joint cover or some other type of sealing device.
 - b. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
 - c. Joints where installation of sealant is specified in another section.
 - d. Joints between suspended panel ceilings/grid and walls.
- B. Interior Joints: Use non-sag polyurethane sealant, unless otherwise indicated.
 - 1. Wall and Ceiling Joints in Non-Wet Areas: Acrylic emulsion latex sealant.

2.02 JOINT SEALANTS - GENERAL

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

2.03 NONSAG JOINT SEALANTS

- A. Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; single or multi-component; not expected to withstand continuous water immersion or traffic.
 - 1. Movement Capability: Plus and minus 25 percent, minimum.
 - 2. Color: Match adjacent finished surfaces.
- B. Polysulfide Sealant: ASTM C920, Grade NS, Uses M and A; single component; not expected to withstand continuous water immersion or traffic.

1. Movement Capability: Plus and minus 25 percent, minimum.
 2. Color: Match adjacent finished surfaces.
- C. Acrylic Emulsion Latex: Water-based; ASTM C834, single component, non-staining, non-bleeding, non-sagging; not intended for exterior use.
1. Color: Standard colors matching finished surfaces, Type OP (opaque).

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that joints are ready to receive work.
- B. Verify that backing materials are compatible with sealants.

3.02 PREPARATION

- A. Remove loose materials and foreign matter that could impair adhesion of sealant.
- B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
- D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

3.03 INSTALLATION

- A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Perform installation in accordance with ASTM C1193.
- C. Install bond breaker backing tape where backer rod cannot be used.
- D. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.
- E. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.
- F. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.

END OF SECTION 07 92 00

SECTION 08 11 13
HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Hollow metal frames for wood doors.
- B. Thermally insulated hollow metal doors with frames.

1.02 RELATED REQUIREMENTS

- A. Section 08 71 00 - Door Hardware.

1.03 ABBREVIATIONS AND ACRONYMS

- A. SDI - Steel Door Institute.

1.04 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors; 2011.
- C. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2014.
- D. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2011.
- E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- F. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable; 2016.
- G. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2015.
- H. BHMA A156.115 - American National Standard for Hardware Preparation in Steel Doors and Steel Frames; 2014.
- I. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2009.
- J. NAAMM HMMA 830 - Hardware Selection for Hollow Metal Doors and Frames; 2002.
- K. NAAMM HMMA 831 - Hardware Locations for Hollow Metal Doors and Frames; 2011.
- L. NAAMM HMMA 840 - Guide Specifications for Installation and Storage of Hollow Metal Doors and Frames; 2007.

1.05 SUBMITTALS

- A. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced standards/guidelines.
- B. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and any indicated finish requirements.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
- B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.

PART 2 PRODUCTS

2.01 DESIGN CRITERIA

- A. Requirements for Hollow Metal Doors and Frames:
 - 1. Steel used for fabrication of doors and frames shall comply with one or more of the following requirements; Galvannealed steel conforming to ASTM A653/A653M, cold-rolled steel conforming to ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel conforming to ASTM A1011/A1011M, Commercial Steel (CS) Type B for each.
 - 2. Accessibility: Comply with ICC A117.1 and ADA Standards.
 - 3. Exterior Door Top Closures: Flush end closure channel, with top and door faces aligned.
 - 4. Door Edge Profile: Manufacturers standard for application indicated.
 - 5. Typical Door Face Sheets: Flush.
 - 6. Hardware Preparations, Selections and Locations: Comply with NAAMM HMMA 830 and NAAMM HMMA 831 or BHMA A156.115 and ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
- B. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.02 HOLLOW METAL DOORS

- A. Exterior Doors: Thermally insulated.
 - 1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
 - a. Level 3 - Extra Heavy-duty.
 - b. Physical Performance Level A, 1,000,000 cycles; in accordance with ANSI/SDI A250.4.
 - c. Model 1 - Full Flush.
 - d. Door Face Metal Thickness: 16 gage, 0.053 inch, minimum.
 - 2. Door Thermal Resistance: R-Value of 6.0 minimum, for installed thickness of polystyrene.
 - 3. Door Thickness: 1-3/4 inch, nominal.
 - 4. Weatherstripping: Refer to Section 08 71 00.
 - 5. Door Finish: Factory primed and field finished.

2.03 HOLLOW METAL FRAMES

- A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.
- B. Exterior Door Frames: Full profile/continuously welded type.
 - 1. Frame Metal Thickness: 16 gage, 0.053 inch, minimum.
 - 2. Frame Finish: Factory primed and field finished.
 - 3. Weatherstripping: Separate, see Section 08 71 00.
- C. Interior Door Frames, Non-Fire Rated: Full profile/continuously welded type.
 - 1. Frame Metal Thickness: 18 gage, 0.042 inch, minimum.
 - 2. Frame Finish: Factory primed and field finished.
- D. Frames for Wood Doors: Comply with frame requirements in accordance with corresponding door.

2.04 FINISHES

- A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.

2.05 ACCESSORIES

- A. Silencers: Resilient rubber, fitted into drilled hole; provide three on strike side of single door, three on center mullion of pairs, and two on head of pairs without center mullions.
- B. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Verify that finished walls are in plane to ensure proper door alignment.

3.02 INSTALLATION

- A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.
- B. Coordinate frame anchor placement with wall construction.
- C. Install door hardware as specified in Section 08 71 00.

3.03 TOLERANCES

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

3.04 ADJUSTING

- A. Adjust for smooth and balanced door movement.

END OF SECTION 08 11 13

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SECTION 08 14 16
FLUSH WOOD DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Flush wood doors; flush configuration; fire-rated and non-rated.

1.02 RELATED REQUIREMENTS

- A. Section 08 11 13 - Hollow Metal Doors and Frames.
- B. Section 08 71 00 - Door Hardware.

1.03 REFERENCE STANDARDS

- A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014.
- B. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 3.0; 2016.
- C. WDMA I.S. 1A - Interior Architectural Wood Flush Doors; 2013.

1.04 SUBMITTALS

- A. Product Data: Indicate door core materials and construction; veneer species, type and characteristics.
- B. Shop Drawings: Show doors and frames, elevations, sizes, types, swings, undercuts, beveling, blocking for hardware, factory machining, factory finishing, cutouts for glazing and other details.
- C. Warranty, executed in Owner's name.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Package, deliver and store doors in accordance with specified quality standard.
- B. Accept doors on site in manufacturer's packaging. Inspect for damage.
- C. Protect doors with resilient packaging sealed with heat shrunk plastic. Do not store in damp or wet areas; or in areas where sunlight might bleach veneer. Seal top and bottom edges with tinted sealer if stored more than one week. Break seal on site to permit ventilation.

1.06 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Interior Doors: Provide manufacturer's warranty for the life of the installation.
- C. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.

PART 2 PRODUCTS

2.01 DOORS AND PANELS

- A. Doors: Refer to drawings for locations and additional requirements.
 - 1. Quality Standard: Custom Grade, Heavy Duty performance, in accordance with AWI/AWMAC/WI (AWS), AWMAC/WI (NAAWS) or WDMA I.S. 1A.
 - 2. Wood Veneer Faced Doors: 5-ply unless otherwise indicated.
- B. Interior Doors: 1-3/4 inches thick unless otherwise indicated; flush construction.
 - 1. Provide solid core doors at each location.
 - 2. Wood veneer facing with factory transparent finish.

2.02 DOOR AND PANEL CORES

- A. Non-Rated Solid Core and 20 Minute Rated Doors: Type particleboard core (PC), plies and faces as indicated.

2.03 DOOR FACINGS

- A. Veneer Facing for Transparent Finish: Red oak, veneer grade in accordance with quality standard indicated, plain sliced (flat cut), with book match between leaves of veneer, running match of spliced veneer leaves assembled on door or panel face.

2.04 DOOR CONSTRUCTION

- A. Fabricate doors in accordance with door quality standard specified.
- B. Cores Constructed with stiles and rails:
 - 1. Provide solid blocks at lock edge for hardware reinforcement.
- C. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.
- D. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.
- E. Provide edge clearances in accordance with the quality standard specified.

2.05 FACTORY FINISHING - WOOD VENEER DOORS

- A. Finish work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 5 - Finishing for grade specified and as follows:
 - 1. Transparent:
 - a. System - 1, Lacquer, Nitrocellulose.
 - b. Stain: As selected by Architect.
 - c. Sheen: Semigloss.
- B. Factory finish doors in accordance with approved sample.
- C. Seal door top edge with color sealer to match door facing.

2.06 ACCESSORIES

- A. Hollow Metal Door Frames: As specified in Section 08 11 13.
- B. Door Hardware: As specified in Section 08 71 00.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

3.02 INSTALLATION

- A. Install doors in accordance with manufacturer's instructions and specified quality standard.
- B. Factory-Finished Doors: Do not field cut or trim; if fit or clearance is not correct, replace door.
- C. Use machine tools to cut or drill for hardware.
- D. Coordinate installation of doors with installation of frames and hardware.

3.03 TOLERANCES

- A. Conform to specified quality standard for fit and clearance tolerances.
- B. Conform to specified quality standard for telegraphing, warp, and squareness.

3.04 ADJUSTING

- A. Adjust doors for smooth and balanced door movement.
- B. Adjust closers for full closure.

END OF SECTION 08 14 16

SECTION 08 43 13
ALUMINUM-FRAMED STOREFRONTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Aluminum-framed storefront, with vision glass and frosted glass.
- B. Door hardware. Also, see Wood Door section.

1.02 RELATED REQUIREMENTS

- A. Section 08 80 00 - Glazing: Glass and glazing accessories.

1.03 REFERENCE STANDARDS

- A. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site; 2015.
- B. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2014 (2015 Errata).
- C. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
- D. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2013.
- E. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2004 (Reapproved 2012).
- F. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014.
- G. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2016).

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, internal drainage details.
- C. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related Work, expansion and contraction joint location and details, and field welding required.
- D. Samples: Submit two samples 12 by 12 inches in size illustrating finished aluminum surface, glass, glazing materials.
- E. Design Data: Provide framing member structural and physical characteristics, engineering calculations, and dimensional limitations.
- F. Hardware Schedule: Complete itemization of each item of hardware to be provided for each door, cross-referenced to door identification numbers in Contract Documents.

1.05 QUALITY ASSURANCE

- A. Designer Qualifications: Design structural support framing components under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in the State in which the Project is located.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Handle products of this section in accordance with AAMA CW-10.
- B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

1.07 FIELD CONDITIONS

- A. Do not install sealants when ambient temperature is less than 40 degrees F. Maintain this minimum temperature during and 48 hours after installation.

1.08 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective Work within a five year period after Date of Substantial Completion.
- C. Provide five year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.
- D. Provide five year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Aluminum-Framed Storefront and Doors:
 - 1. EFCO Corporation: www.efcocorp.com/#sle.
 - 2. Kawneer North America: www.kawneer.com/#sle.
 - 3. Tubelite, Inc: www.tubeliteinc.com/#sle.
 - 4. Substitutions: of equal material.

2.02 STOREFRONT

- A. Aluminum-Framed Storefront: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
 - 1. Glazing Rabbet: For 1 inch insulating glazing.
 - 2. Glazing Rabbet: For 1/4 inch monolithic glazing.
 - 3. Glazing Position: Centered (front to back).
 - 4. Vertical Mullion Dimensions: 2 inches wide by 4-1/2 inches deep.
 - 5. Finish: Class II natural anodized.
 - a. Factory finish all surfaces that will be exposed in completed assemblies.
 - 6. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors and hardware; fasteners and attachments concealed from view; reinforced as required for imposed loads.
 - 7. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.
 - 8. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
 - 9. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.
 - 10. Movement: Allow for movement between storefront and adjacent construction, without damage to components or deterioration of seals.
 - 11. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.
- B. Performance Requirements:
 - 1. Wind Loads: Design and size components to withstand the specified load requirements without damage or permanent set, when tested in accordance with ASTM E330/E330M, using loads 1.5 times the design wind loads and 10 second duration of maximum load.
 - a. Member Deflection: Limit member deflection to flexure limit of glass in any direction, with full recovery of glazing materials.
 - 2. Water Penetration Resistance: No uncontrolled water on interior face, when tested in accordance with ASTM E331 at pressure differential of 8 psf.

3. Air Leakage: Maximum of 0.06 cu ft/min sq ft of wall area, when tested in accordance with ASTM E283 at 6.27 psf pressure differential across assembly.

2.03 COMPONENTS

- A. Aluminum Framing Members: Tubular aluminum sections, drainage holes and internal weep drainage system.
 1. Glazing Stops: Flush.
- B. Glazing: As specified in Section 08 80 00.
- C. Swing Doors: Glazed aluminum and Wood (see Section 08 14 16).
 1. Thickness: 1-3/4 inches.
 2. Top Rail: 4 inches wide.
 3. Vertical Stiles: 4-1/2 inches wide.
 4. Bottom Rail: 10 inches wide.
 5. Glazing Stops: Square.
 6. Finish: Same as storefront.

2.04 MATERIALS

- A. Extruded Aluminum: ASTM B221 (ASTM B221M).
- B. Fasteners: Stainless steel.
- C. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.

2.05 FINISHES

- A. Class II Natural Anodized Finish: AAMA 611 AA-M12C22A31 Clear anodic coating not less than 0.4 mils thick.

2.06 HARDWARE

- A. For each door, include weatherstripping, sill sweep strip, and threshold.
- B. Other Door Hardware: Storefront manufacturer's standard type to suit application.
 1. Finish on Hand-Contacted Items: Polished chrome.
 2. For each door, include butt hinges, pivots, push handle, pull handle, exit device, narrow stile handle latch, closer, and locksets.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify dimensions, tolerances, and method of attachment with other work.
- B. Verify that wall openings and adjoining air and vapor seal materials are ready to receive work of this section.

3.02 INSTALLATION

- A. Install wall system in accordance with manufacturer's instructions.
- B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
- C. Provide alignment attachments and shims to permanently fasten system to building structure.
- D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
- E. Provide thermal isolation where components penetrate or disrupt building insulation.
- F. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.
- G. Where fasteners penetrate sill flashings, make watertight by seating and sealing fastener heads to sill flashing.
- H. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

- I. Set thresholds in bed of sealant and secure.
- J. Install hardware using templates provided.
- K. Install glass and infill panels in accordance with Section 08 80 00, using glazing method required to achieve performance criteria.
- L. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

3.03 ADJUSTING

- A. Adjust operating hardware for smooth operation.

3.04 CLEANING

- A. Remove protective material from pre-finished aluminum surfaces.

3.05 PROTECTION

- A. Protect installed products from damage until Date of Substantial Completion.

END OF SECTION 08 43 13

SECTION 08 51 13
ALUMINUM WINDOWS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Extruded aluminum windows with fixed sash.
- B. Factory glazing.

1.02 REFERENCE STANDARDS

- A. AAMA/WDMA/CSA 101/I.S.2/A440 - North American Fenestration Standard/Specification for windows, doors, and skylights; 2011.
- B. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site; 2015.
- C. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2014 (2015 Errata).

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide component dimensions, information on glass and glazing, internal drainage details, and descriptions of hardware and accessories.
- C. Shop Drawings: Indicate opening dimensions, elevations of different types, framed opening tolerances, method for achieving air and vapor barrier seal to adjacent construction, anchorage locations, and installation requirements.
- D. Grade Substantiation: Prior to submitting shop drawings or starting fabrication, submit one of the following showing compliance with specified grade:
 - 1. Evidence of AAMA Certification.
 - 2. Evidence of WDMA Certification.
 - 3. Evidence of CSA Certification.
 - 4. Test report(s) by independent testing agency itemizing compliance and acceptable to authorities having jurisdiction.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of AAMA CW-10.
- B. Protect finished surfaces with wrapping paper or strippable coating during installation. Do not use adhesive papers or sprayed coatings that bond to substrate when exposed to sunlight or weather.

PART 2 PRODUCTS

2.01 WINDOWS

- A. Aluminum Windows: Extruded aluminum frame and sash, factory fabricated, factory finished, with operating hardware, related flashings, and anchorage and attachment devices.
 - 1. Frame Depth: Match existing windows. Field verify wall depth.
 - 2. Provide units factory glazed.
 - 3. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors; fasteners and attachments concealed from view; reinforced as required for operating hardware and imposed loads.
 - 4. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.
 - 5. Movement: Accommodate movement between window and perimeter framing and deflection of lintel, without damage to components or deterioration of seals.
 - 6. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
- B. Performance Requirements: Provide products that comply with the following:
 - 1. Grade: AAMA/WDMA/CSA 101/I.S.2/A440 requirements for specific window type:

- a. Performance Class (PC): R.
- C. Fixed, Non-Operable Type:
 - 1. Construction: Thermally broken.
 - 2. Glazing: Double; clear; transparent.
 - 3. Exterior Finish: Class II color anodized. Match existing window color.
 - 4. Interior Finish: Class II color anodized. Match existing window color.

2.02 FINISHES

- A. Class II Color Anodized Finish: AAMA 611 AA-M12C22A34 Electrolytically deposited colored anodic coating not less than 0.4 mils thick.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that wall openings and adjoining air and vapor seal materials are ready to receive aluminum windows.

3.02 INSTALLATION

- A. Install windows in accordance with manufacturer's instructions.
- B. Attach window frame and shims to perimeter opening to accommodate construction tolerances and other irregularities.
- C. Align window plumb and level, free of warp or twist. Maintain dimensional tolerances and alignment with adjacent work.
- D. Install sill and sill end angles.
- E. Set sill members and sill flashing in continuous bead of sealant.
- F. Provide thermal isolation where components penetrate or disrupt building insulation. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

3.03 CLEANING

- A. Remove protective material from factory finished aluminum surfaces.
- B. Wash surfaces by method recommended and acceptable to window manufacturer; rinse and wipe surfaces clean.

END OF SECTION 08 51 13

SECTION 08 71 00
DOOR HARDWARE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Hardware for wood and hollow metal doors.
- B. Hardware for fire-rated doors.
- C. Thresholds.

1.02 RELATED REQUIREMENTS

- A. Section 08 11 13 - Hollow Metal Doors and Frames.
- B. Section 08 14 16 - Flush Wood Doors.

1.03 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. BHMA A156.1 - American National Standard for Butts and Hinges; 2013.
- C. BHMA A156.25 - American National Standard for Electrified Locking Devices; 2013.
- D. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2009.
- E. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2016.
- F. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2012.
- G. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.
- H. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the manufacture, fabrication, and installation of products that door hardware is installed on.
- B. Furnish templates for door and frame preparation to manufacturers and fabricators of products requiring internal reinforcement for door hardware.
- C. Keying Requirements Meeting:
 - 1. Schedule meeting at project site prior to Contractor occupancy.
 - 2. Attendance Required:
 - a. Contractor.
 - b. Owner.
 - c. Architect.
 - d. Installer's Architectural Hardware Consultant (AHC).
 - e. Hardware Installer.
 - 3. Agenda:
 - a. Establish keying requirements.
 - b. Verify locksets and locking hardware are functionally correct for project requirements.
 - 4. Incorporate "Keying Requirements Meeting" decisions into keying submittal upon review of door hardware keying system including, but not limited to, the following:
 - a. Key control system requirements.
 - 5. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.
 - 6. Deliver established keying requirements to manufacturers.

1.05 SUBMITTALS

- A. Product Data: Manufacturer's catalog literature for each type of hardware, marked to clearly show products to be furnished for this project, and includes construction details, material descriptions, finishes, and dimensions and profiles of individual components.

- B. Shop Drawings - Door Hardware Schedule: Submit detailed listing that includes each item of hardware to be installed on each door. Use door numbering scheme as included in Contract Documents.
 - 1. Prepared by or under supervision of Architectural Hardware Consultant (AHC).
 - 2. Provide complete description for each door listed.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Package hardware items individually; label and identify each package with door opening code to match door hardware schedule.

1.07 WARRANTY

- A. Warranty against defects in material and workmanship for period indicated, from Date of Substantial Completion.
 - 1. Closers: Five years, minimum.
 - 2. Exit Devices: Three years, minimum.
 - 3. Locksets and Cylinders: Three years, minimum.
 - 4. Other Hardware: Two years, minimum.

PART 2 PRODUCTS

2.01 DESIGN AND PERFORMANCE CRITERIA

- A. Provide specified door hardware as required to make doors fully functional, compliant with applicable codes, and secure to extent indicated.
- B. Provide individual items of single type, of same model, and by same manufacturer.
- C. Provide door hardware products that comply with the following requirements:
 - 1. Applicable provisions of federal, state, and local codes.
 - 2. Accessibility: ADA Standards and ICC A117.1.
 - 3. Fire-Rated Doors: NFPA 80, listed and labeled by qualified testing agency for fire protection ratings indicated, based on testing at positive pressure in accordance with NFPA 252 or UL 10C.

2.02 HINGES

- A. Hinges: Complying with BHMA A156.1, Grade 1.
 - 1. Provide hinges on every swinging door.
 - 2. Provide five-knuckle full mortise butt hinges unless otherwise indicated.
 - 3. Provide following quantity of butt hinges for each door:
 - a. Doors From 60 inches High up to 90 inches High: Three hinges.

2.03 WIRELESS ACCESS MANAGEMENT SYSTEMS

- A. Wireless Access Management Systems: Complying with guidelines of BHMA A156.25, and including necessary hardware for fully functional system.
 - 1. Reader Formats: Provide magnetic stripe, proximity, dual validation, or key Fob to activate access system functionality.
 - 2. Door Locking Hardware: Provide applicable cylindrical locksets, panic hardware, or mortise locksets in compliance with project access control requirements.

2.04 POWER SUPPLY

- A. Power Supply: Hard wired, with multiple zones providing eight (8) breakers for each output panel with individual control switches and LED's; UL (DIR) Class 2 listed.
 - 1. Power: 24 VAC, 10 Amp; with 120 VAC power supply.
 - 2. Operating Temperature: 32 to 110 degrees F.
 - 3. Provide with emergency release terminals that release devices upon activation of fire alarm system.

2.05 FINISHES

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install hardware in accordance with manufacturer's instructions and applicable codes.
- B. Install hardware on fire-rated doors and frames in accordance with applicable codes and NFPA 80.
- C. Use templates provided by hardware item manufacturer.
- D. Door Hardware Mounting Heights: Distance from finished floor to center line of hardware item. As indicated in following list; unless noted otherwise in Door Hardware Schedule or on drawings.
 - 1. For Steel Doors and Frames: Refer to Section 08 11 13.
 - 2. Flush Wood Doors: Refer to Section 08 14 16.
 - 3. Mounting heights in compliance with ADA Standards:
 - a. Locksets: 40-5/16 inch.
 - b. Push Plates/Pull Bars: 42 inch.
 - c. Deadlocks (Deadbolts): 48 inch.
 - d. Exit Devices: 40-5/16 inch.
- E. Set exterior door thresholds with full-width bead of elastomeric sealant at each point of contact with floor providing a continuous weather seal; anchor thresholds with stainless steel countersunk screws.

3.02 FIELD QUALITY CONTROL

- A. Perform field inspection and testing under provisions of Section 01 40 00 - Quality Requirements.

3.03 ADJUSTING

- A. Adjust work under provisions of Section 01 70 00 - Execution and Closeout Requirements.
- B. Adjust hardware for smooth operation.
- C. Adjust gasketing for complete, continuous seal; replace if unable to make complete seal.

3.04 CLEANING

- A. Clean finished hardware in accordance with manufacturer's written instructions after final adjustments have been made.
- B. Clean adjacent surfaces soiled by hardware installation.
- C. Replace items that cannot be cleaned to manufacturer's level of finish quality at no additional cost.

3.05 PROTECTION

- A. Protect finished Work under provisions of Section 01 70 00 - Execution and Closeout Requirements.
- B. Do not permit adjacent work to damage hardware or finish.

END OF SECTION 08 71 00

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SECTION 08 80 00

GLAZING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Insulating glass units.
- B. Glazing units.
- C. Glazing compounds and accessories.

1.02 REFERENCE STANDARDS

- A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; current edition.
- B. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test; 2015.
- C. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers; 2005 (Reapproved 2015).
- D. ASTM C1036 - Standard Specification for Flat Glass; 2016.
- E. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2012.
- F. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016.
- G. ASTM C1376 - Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass; 2015.
- H. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings; 2016.
- I. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation; 2010.
- J. GANA (SM) - GANA Sealant Manual; 2008.
- K. NFRC 100 - Procedure for Determining Fenestration Product U-factors; 2014.
- L. NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence; 2014.
- M. NFRC 300 - Test Method for Determining the Solar Optical Properties of Glazing Materials and Systems; 2014.

1.03 SUBMITTALS

- A. Product Data on Insulating Glass Unit and Glazing Unit Glazing Types: Provide structural, physical and environmental characteristics, size limitations, special handling and installation requirements.
- B. Product Data on Glazing Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements. Identify available colors.
- C. Samples: Submit two samples 4 by 4 inch in size of glass units.
- D. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.04 FIELD CONDITIONS

- A. Do not install glazing when ambient temperature is less than 40 degrees F.
- B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.05 WARRANTY

- A. Insulating Glass Units: Provide a five (5) year manufacturer warranty to include coverage for seal failure, interpane dusting or misting, including providing products to replace failed units.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS - EXTERIOR GLAZING ASSEMBLIES

- A. Provide type and thickness of exterior glazing assemblies to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of glass.
 - 1. Comply with ASTM E1300 for design load resistance of glass type, thickness, dimensions, and maximum lateral deflection of supported glass.
 - 2. Provide glass edge support system sufficiently stiff to limit the lateral deflection of supported glass edges to less than 1/175 of their lengths under specified design load.
 - 3. Glass thicknesses listed are minimum.
- B. Vapor Retarder and Air Barrier Seals: Provide completed assemblies that maintain continuity of building enclosure vapor retarder and air barrier.
 - 1. In conjunction with vapor retarder and joint sealer materials described in other sections.
- C. Thermal and Optical Performance: Provide exterior glazing products with performance properties as indicated. Performance properties are in accordance with manufacturer's published data as determined with the following procedures and/or test methods:
 - 1. Center of Glass U-Value: Comply with NFRC 100 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
 - 2. Center of Glass Solar Heat Gain Coefficient (SHGC): Comply with NFRC 200 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
 - 3. Solar Optical Properties: Comply with NFRC 300 test method.

2.02 GLASS MATERIALS

- A. Float Glass: Provide float glass based glazing unless noted otherwise.
 - 1. Annealed Type: ASTM C1036, Type I - Transparent Flat, Class 1 - Clear, Quality-Q3.
 - 2. Heat-Strengthened and Fully Tempered Types: ASTM C1048, Kind HS and FT.
 - 3. Fully Tempered Safety Glass: Complies with ANSI Z97.1 and 16 CFR 1201 criteria.
 - 4. Patterned Glass Type: ASTM C1036, Type II - Patterned Flat Glass, Quality-Q5, Form 3 - Patterned glass, color and performance characteristics as indicated.

2.03 INSULATING GLASS UNITS

- A. Insulating Glass Units: Types as indicated.
 - 1. Durability: Certified by an independent testing agency to comply with ASTM E2190.
 - 2. Coated Glass: Comply with requirements of ASTM C1376 for pyrolytic (hard-coat) or magnetic sputter vapor deposition (soft-coat) type coatings on flat glass; coated vision glass, Kind CV; coated overhead glass, Kind CO; or coated spandrel glass, Kind CS.
 - 3. Spacer Color: Black.
 - 4. Edge Seal:
 - a. Dual-Sealed System: Provide polyisobutylene sealant as primary seal applied between spacer and glass panes, and silicone, polysulfide, or polyurethane sealant as secondary seal applied around perimeter.
 - 5. Color: Black.
 - 6. Purge interpane space with dry air, hermetically sealed.
- B. Insulating Glass Units: Vision glass, double glazed.
 - 1. Applications: Exterior glazing unless otherwise indicated.
 - 2. Space between lites filled with air.
 - 3. Outboard Lite: Annealed float glass, 1/4 inch thick, minimum.
 - a. Tint: Clear.
 - b. Coating: Low-E (passive type), on #2 surface.
 - 4. Inboard Lite: Annealed float glass, 1/4 inch thick, minimum.
 - a. Tint: Clear.
 - 5. Total Thickness: 1 inch.
 - 6. Thermal Transmittance (U-Value), Summer - Center of Glass: _____, nominal.
 - 7. Visible Light Transmittance (VLT): _____ percent, nominal.

8. Solar Heat Gain Coefficient (SHGC): _____, nominal.

2.04 GLAZING UNITS

- A. Monolithic Interior Vision Glazing:
 1. Applications: Interior glazing unless otherwise indicated.
 2. Glass Type: Annealed float glass.
 3. Tint: Clear.
 4. Thickness: 1/4 inch, nominal.
 5. Glazing Method: Dry glazing method, gasket glazing.
- B. Type G-5 - Monolithic Safety Glazing: Non-fire-rated.
 1. Applications:
 - a. Other locations indicated on drawings.
 2. Glass Type: Fully tempered safety glass as specified.
 3. Tint: Clear.
 4. Thickness: 1/4 inch, nominal.
- C. Type G-11 - Patterned Glazing: Textured or rolled glass; translucent, showing shadows but not form.
 1. Applications: Locations as indicated on drawings.
 2. Finish: F1 - Patterned one side; ASTM C1036.
 3. Style: As indicated on drawings.
 4. Tint: Clear.
 5. Glass Type: Fully tempered.
 6. Thickness: 1/4 inch, nominal.
- D. Type G-15 - Satin-Etched Glazing: Etched glass patterns as full-coverage or as discrete designs, applied to single side or to both sides.
 1. Applications: Locations as indicated on drawings.
 2. Tint: Clear.
 3. Glass Type: Annealed; monolithic glass system.
- E. Type G-14 - Direct to Glass Ceramic Printing: Ceramic frit is fused into glass creating permanent designs.
 1. Applications: Locations as indicated on drawings.
 2. Glass Type: Fully tempered; monolithic glass system.

2.05 GLAZING COMPOUNDS

2.06 ACCESSORIES

- A. Setting Blocks: Silicone, with 80 to 90 Shore A durometer hardness; ASTM C864 Option II. Length of 0.1 inch for each square foot of glazing or minimum 4 inch x width of glazing rabbet space minus 1/16 inch x height to suit glazing method and pane weight and area.
- B. Glazing Splines: Resilient silicone extruded shape to suit glazing channel retaining slot; ASTM C864 Option II; color black.

PART 3 EXECUTION

3.01 VERIFICATION OF CONDITIONS

- A. Verify that openings for glazing are correctly sized and within tolerances, including those for size, squareness, and offsets at corners.
- B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and support framing is ready to receive glazing system.

3.02 PREPARATION

- A. Clean contact surfaces with appropriate solvent and wipe dry within maximum of 24 hours before glazing. Remove coatings that are not tightly bonded to substrates.
- B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.

- C. Prime surfaces scheduled to receive sealant where required for proper sealant adhesion.

3.03 INSTALLATION, GENERAL

- A. Install glazing sealants in accordance with ASTM C1193, GANA (SM), and manufacturer's instructions.
- B. Do not exceed edge pressures around perimeter of glass lites as stipulated by glass manufacturer.

3.04 INSTALLATION - DRY GLAZING METHOD (GASKET GLAZING)

- A. Application - Exterior and/or Interior Glazed: Set glazing infills from either the exterior or the interior of the building.
- B. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.
- C. Rest glazing on setting blocks and push against fixed stop with sufficient pressure on gasket to attain full contact.
- D. Install removable stops without displacing glazing gasket; exert pressure for full continuous contact.

3.05 CLEANING

- A. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers.
- B. Remove non-permanent labels immediately after glazing installation is complete.
- C. Clean glass and adjacent surfaces after sealants are fully cured.
- D. Clean glass on both exposed surfaces not more than 4 days prior to Date of Substantial Completion in accordance with glass manufacturer's written recommendations.

3.06 PROTECTION

- A. After installation, mark pane with an 'X' by using removable plastic tape or paste; do not mark heat absorbing or reflective glass units.
- B. Remove and replace glass that is damaged during construction period prior to Date of Substantial Completion.

END OF SECTION 08 80 00

SECTION 09 21 16
GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Acoustic insulation.
- B. Gypsum wallboard.
- C. Joint treatment and accessories.
- D. Textured finish system.

1.02 REFERENCE STANDARDS

- A. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2015.
- B. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2012.
- C. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2017.
- D. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2016.
- E. ASTM C1047 - Standard Specification for Accessories For Gypsum Wallboard and Gypsum Veneer Base; 2014a.
- F. ASTM C1178/C1178M - Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel; 2013.
- G. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2014a.
- H. ASTM C1658/C1658M - Standard Specification for Glass Mat Gypsum Panels; 2013.
- I. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2016.
- J. GA-216 - Application and Finishing of Gypsum Board; 2016.

1.03 SUBMITTALS

- A. Shop Drawings: Indicate special details associated with fireproofing and acoustic seals.
- B. Product Data: Provide data on metal framing, gypsum board, accessories, and joint finishing system.

PART 2 PRODUCTS

2.01 GYPSUM BOARD ASSEMBLIES

- A. Provide completed assemblies complying with ASTM C840 and GA-216.

2.02 BOARD MATERIALS

- A. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
 - 1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
 - 2. Glass mat faced gypsum panels as defined in ASTM C1658/C1658M, suitable for paint finish, of the same core type and thickness may be substituted for paper-faced board.
 - 3. Thickness:
 - a. Vertical Surfaces: 5/8 inch.
 - b. Ceilings: 5/8 inch.
- B. Backing Board For Wet Areas: One of the following products:
 - 1. Application: Surfaces behind tile in wet areas including tub and shower surrounds and shower ceilings.
 - 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.

3. Glass Mat Faced Board: Coated glass mat water-resistant gypsum backing panel as defined in ASTM C1178/C1178M.
 - a. Standard Type: Thickness 5/8 inch.
- C. Ceiling Board: Special sag resistant gypsum ceiling board as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
 1. Application: Ceilings, unless otherwise indicated.
 2. Thickness: 5/8 inch.
 3. Edges: Tapered.

2.03 ACCESSORIES

- A. Acoustic Insulation: ASTM C665; preformed glass fiber, friction fit type, unfaced.
- B. Acoustic Sealant: Acrylic emulsion latex or water-based elastomeric sealant; do not use solvent-based non-curing butyl sealant.
- C. Beads, Joint Accessories, and Other Trim: ASTM C1047, rigid plastic, galvanized steel, or rolled zinc, unless noted otherwise.
 1. Rigid Corner Beads: Low profile, for 90 degree outside corners.
- D. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
 1. Tape: 2 inch wide, coated glass fiber tape for joints and corners, except as otherwise indicated.
- E. Textured Finish Materials: Latex-based compound; plain.
- F. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Studs Less than 0.033 inch in Thickness and Wood Members: ASTM C1002; self-piercing tapping screws, corrosion resistant.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that project conditions are appropriate for work of this section to commence.

3.02 ACOUSTIC ACCESSORIES INSTALLATION

- A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.
- B. Acoustic Sealant: Install in accordance with manufacturer's instructions.

3.03 BOARD INSTALLATION

- A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.
- B. Single-Layer Non-Rated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.
 1. Exception: Tapered edges to receive joint treatment at right angles to framing.
- C. Exposed Gypsum Board in Interior Wet Areas: Seal joints, cut edges, and holes with water-resistant sealant.

3.04 JOINT TREATMENT

- A. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
 1. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
 2. Level 1: Fire rated wall areas above finished ceilings, whether or not accessible in the completed construction.
- B. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
 1. Feather coats of joint compound so that camber is maximum 1/32 inch.

END OF SECTION 09 21 16

SECTION 09 22 16
NON-STRUCTURAL METAL FRAMING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Metal partition, ceiling, and soffit framing.
- B. Framing accessories.

1.02 REFERENCE STANDARDS

- A. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2014.
- B. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2017.
- C. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2016.

1.03 SUBMITTALS

- A. Product Data: Provide data describing framing member materials and finish, product criteria, load charts, and limitations.

PART 2 PRODUCTS

2.01 FRAMING MATERIALS

- A. Non-Loadbearing Framing System Components: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/240 at 5 psf.
 - 1. Studs: C shaped with flat or formed webs with knurled faces.
 - 2. Runners: U shaped, sized to match studs.
 - 3. Ceiling Channels: C shaped.
 - 4. Furring: Hat-shaped sections, minimum depth of 7/8 inch.
- B. Ceiling Hangers: Type and size as specified in ASTM C754 for spacing required.
- C. Furring and Bracing Members: Of same material as studs; thickness to suit purpose; complying with applicable requirements of ASTM C754.
- D. Fasteners: ASTM C1002 self-piercing tapping screws.

PART 3 EXECUTION

3.01 INSTALLATION OF STUD FRAMING

- A. Extend partition framing to structure where indicated and to ceiling in other locations.
- B. Partitions Terminating at Ceiling: Attach ceiling runner securely to ceiling track in accordance with manufacturer's instructions.
- C. Align and secure top and bottom runners at 24 inches on center.
- D. Fit runners under and above openings; secure intermediate studs to same spacing as wall studs.
- E. Install studs vertically at 16 inches on center.
- F. Align stud web openings horizontally.
- G. Secure studs to tracks using crimping method. Do not weld.
- H. Fabricate corners using a minimum of three studs.
- I. Double stud at wall openings, door and window jambs, not more than 2 inches from each side of openings.
- J. Coordinate installation of bucks, anchors, and blocking with electrical, mechanical, and other work to be placed within or behind stud framing.

- K. Furring: Install at spacing and locations shown on drawings. Lap splices a minimum of 6 inches.

3.02 CEILING AND SOFFIT FRAMING

- A. Install furring after work above ceiling or soffit is complete. Coordinate the location of hangers with other work.
- B. Install furring independent of walls, columns, and above-ceiling work.
- C. Securely anchor hangers to structural members or embed in structural slab. Space hangers as required to limit deflection to criteria indicated. Use rigid hangers at exterior soffits.
- D. Space main carrying channels at maximum 72 inch on center, and not more than 6 inches from wall surfaces. Lap splice securely.
- E. Securely fix carrying channels to hangers to prevent turning or twisting and to transmit full load to hangers.
- F. Place furring channels perpendicular to carrying channels, not more than 2 inches from perimeter walls, and rigidly secure. Lap splices securely.

3.03 TOLERANCES

- A. Maximum Variation From True Position: 1/8 inch in 10 feet.
- B. Maximum Variation From Plumb: 1/8 inch in 10 feet.

END OF SECTION 09 22 16

SECTION 09 30 00

TILING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Tile for floor applications.
- B. Tile for wall applications.
- C. Coated glass mat backer board as tile substrate.
- D. Stone thresholds.
- E. Ceramic accessories.
- F. Ceramic trim.

1.02 REFERENCE STANDARDS

- A. ANSI A108.1a - American National Standard Specifications for Installation of Ceramic Tile in the Wet-Set Method, with Portland Cement Mortar; 2014.
- B. ANSI A108.1b - American National Standard Specifications for Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex-Portland Cement Mortar; 1999 (Reaffirmed 2010).
- C. ANSI A108.1c - Specifications for Contractors Option: Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar or Installation of Ceramic Tile on a Cured Portland Cement Mortar Bed with Dry-Set or Latex-Portland Cement; 1999 (Reaffirmed 2010).
- D. ANSI A108.4 - American National Standard Specifications for Installation of Ceramic Tile with Organic Adhesives or Water Cleanable Tile-Setting Epoxy Adhesive; 2009 (Revised).
- E. ANSI A108.5 - American National Standard Specifications for Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar; 1999 (Reaffirmed 2010).
- F. ANSI A108.6 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy; 1999 (Reaffirmed 2010).
- G. ANSI A108.8 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant Furan Resin Mortar and Grout; 1999 (Reaffirmed 2010).
- H. ANSI A108.9 - American National Standard Specifications for Installation of Ceramic Tile with Modified Epoxy Emulsion Mortar/Grout; 1999 (Reaffirmed 2010).
- I. ANSI A108.10 - American National Standard Specifications for Installation of Grout in Tilework; 1999 (Reaffirmed 2010).
- J. ANSI A108.11 - American National Standard Specifications for Interior Installation of Cementitious Backer Units; 2010 (Reaffirmed 2016).
- K. ANSI A108.11> ANSI A108/A118/A136.1 - American National Standard for Interior of Cementitious Backer Units; 2010 (Revised).
- L. ANSI A108.12 - American National Standard for Installation of Ceramic Tile with EGP (Exterior Glue Plywood) Latex-Portland Cement Mortar; 1999 (Reaffirmed 2010).
- M. ANSI A108.13 - American National Standard for Installation of Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone; 2005 (Reaffirmed 2010).
- N. ANSI A118.3 - American National Standard Specifications for Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy and Water Cleanable Tile-Setting Epoxy Adhesive; 2013 (Revised).
- O. ANSI A118.4 - American National Standard Specifications for Modified Dry-Set Cement Mortar; 2012 (Revised).

- P. ANSI A118.6 - American National Standard Specifications for Standard Cement Grouts for Tile Installation; 2010 (Revised).
- Q. ANSI A118.9 - American National Standard Specifications for Test Methods and Specifications for Cementitious Backer Units; 1999 (Reaffirmed 2016).
- R. ANSI A118.9>ANSI A108/A118/A136.1 - American National Standard Specifications for Test Methods and Specifications for Cementitious Backer Units; 1999 (Reaffirmed 2010).
- S. ANSI A118.10 - American National Standard Specifications for Load Bearing, Bonded, Waterproof Membranes For Thin-Set Ceramic Tile And Dimension Stone Installation; 2014.
- T. ANSI A118.12 - American National Standard Specifications for Crack Isolation Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation; 2014.
- U. ANSI A118.15 - American National Standard Specifications for Improved Modified Dry-Set Cement Mortar; 2012.
- V. ANSI A137.1 - American National Standard Specifications for Ceramic Tile; 2013.1.
- W. ASTM C1178/C1178M - Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel; 2013.
- X. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation; 2016.

1.03 SUBMITTALS

- A. Product Data: Provide manufacturers' data sheets on tile, mortar, grout, and accessories. Include instructions for using grouts and adhesives.
- B. Shop Drawings: Indicate tile layout, patterns, color arrangement, perimeter conditions, junctions with dissimilar materials, control and expansion joints, thresholds, ceramic accessories, and setting details.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 TILE

- A. Glazed Wall Tile: ANSI A137.1, standard grade.
 - 1. Size: 4" by 8", nominal.
 - 2. Edges: Cushioned.
 - 3. Surface Finish: High gloss.
 - 4. Color(s): To be selected by Architect from manufacturer's standard range.
 - 5. Pattern: as shown on drawings.
 - 6. Trim Units: Matching bead, bullnose, cove, and base shapes in sizes coordinated with field tile.

2.02 TRIM AND ACCESSORIES

- A. Ceramic Accessories: Glazed finish, same color and finish as adjacent field tile; same manufacturer as tile.
- B. Ceramic Trim: Matching bullnose, double bullnose, cove base, and cove ceramic shapes in sizes coordinated with field tile.
 - 1. Manufacturers: Same as for tile.
- C. Thresholds: Marble, white or gray, honed finish; 2 inches wide by full width of wall or frame opening; 1/2 inch thick; beveled one long edge with radiused corners on top side; without holes, cracks, or open seams.
 - 1. Applications:
 - a. At doorways where tile terminates.

2.03 SETTING MATERIALS

- A. Latex-Portland Cement Mortar Bond Coat: ANSI A118.4 or ANSI A118.15.

- B. Epoxy Adhesive and Mortar Bond Coat: ANSI A118.3.
- C. Mortar Bed Materials: Pre-packaged mix of Portland cement, sand, latex additive, and water.

2.04 GROUTS

- A. Standard Grout: ANSI A118.6 standard cement grout.
 - 1. Applications: Use this type of grout where indicated and where no other type of grout is indicated.
 - 2. Use sanded grout for joints 1/8 inch wide and larger; use unsanded grout for joints less than 1/8 inch wide.
 - 3. Color(s): As selected by Architect from manufacturer's full line.
- B. Epoxy Grout: ANSI A118.3 chemical resistant and water-cleanable epoxy grout.
 - 1. Applications: Where indicated.
 - 2. Color(s): As selected by Architect from manufacturer's full line.

2.05 ACCESSORY MATERIALS

- A. Concrete Floor Slab Crack Isolation Membrane: Material complying with ANSI A118.12; not intended as waterproofing.
 - 1. Type: Fluid-applied.
 - 2. Thickness: 20 mils, maximum.
 - 3. Crack Resistance: No failure at 1/16 inch gap, minimum.
- B. Waterproofing Membrane at Floors: Specifically designed for bonding to cementitious substrate under thick mortar bed or thin-set tile; complying with ANSI A118.10.
- C. Backer Board: Cementitious type complying with ANSI A118.9; high density, glass fiber reinforced, 1/2 inch thick; 2 inch wide coated glass fiber tape for joints and corners.
- D. Backer Board: Coated glass mat type complying with ASTM C1178/C1178M; inorganic fiberglass mat on both surfaces and integral acrylic coating vapor retarder.
 - 1. Standard Type: Thickness 5/8 inch.
- E. Mesh Tape: 2 inch wide self-adhesive fiberglass mesh tape.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that sub-floor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive tile.
- B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive tile.

3.02 PREPARATION

- A. Protect surrounding work from damage.
- B. Vacuum clean surfaces and damp clean.
- C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.
- D. Install backer board in accordance with ANSI A108.11 and board manufacturer's instructions. Tape joints and corners, cover with skim coat of setting material to a feather edge.

3.03 INSTALLATION - GENERAL

- A. Install tile and thresholds and grout in accordance with applicable requirements of ANSI A108.1a through ANSI A108.13, manufacturer's instructions, and TCNA (HB) recommendations.
- B. Lay tile to pattern indicated. Do not interrupt tile pattern through openings.
- C. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.

- D. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make grout joints without voids, cracks, excess mortar or excess grout, or too little grout.
- E. Form internal angles square and external angles bullnosed.
- F. Install ceramic accessories rigidly in prepared openings.
- G. Install thresholds where indicated.
- H. Sound tile after setting. Replace hollow sounding units.
- I. Keep control and expansion joints free of mortar, grout, and adhesive.
- J. Prior to grouting, allow installation to completely cure; minimum of 48 hours.
- K. Grout tile joints unless otherwise indicated. Use standard grout unless otherwise indicated.
- L. At changes in plane and tile-to-tile control joints, use tile sealant instead of grout, with either bond breaker tape or backer rod as appropriate to prevent three-sided bonding.

3.04 INSTALLATION - FLOORS - THIN-SET METHODS

- A. Over interior concrete substrates, install in accordance with TCNA (HB) Method F113, dry-set or latex-Portland cement bond coat, with standard grout, unless otherwise indicated.

3.05 INSTALLATION - SHOWERS AND BATHTUB WALLS

- A. At tiled shower receptors install in accordance with TCNA (HB) Method B415, mortar bed floor, and W244, thin-set over cementitious backer unit walls.
- B. Grout with standard grout as specified above.

3.06 INSTALLATION - WALL TILE

- A. Over coated glass mat backer board on studs, install in accordance with TCNA (HB) Method W245.

3.07 CLEANING

- A. Clean tile and grout surfaces.

3.08 PROTECTION

- A. Do not permit traffic over finished floor surface for 4 days after installation.

END OF SECTION 09 30 00

**SECTION 09 65 00
RESILIENT FLOORING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Resilient base.

1.02 REFERENCE STANDARDS

- A. ASTM F1861 - Standard Specification for Resilient Wall Base; 2008 (Reapproved 2012).

1.03 SUBMITTALS

- A. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Upon receipt, immediately remove any shrink-wrap and check materials for damage and the correct style, color, quantity and run numbers.

PART 2 PRODUCTS

2.01 RESILIENT BASE

- A. Resilient Base: ASTM F1861, Type TP, rubber, thermoplastic; top set Style B, Cove.
 - 1. Height: 4 inch.
 - 2. Thickness: 0.125 inch.
 - 3. Finish: Satin.
 - 4. Length: Roll.
 - 5. Color: To be selected by Architect from manufacturer's full range.
 - 6. Accessories: Premolded external corners and internal corners.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.
- B. Cementitious Sub-floor Surfaces: Verify that substrates are dry enough and ready for resilient flooring installation by testing for moisture and pH.
 - 1. Obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.

3.02 INSTALLATION - GENERAL

- A. Starting installation constitutes acceptance of sub-floor conditions.
- B. Install in accordance with manufacturer's written instructions.
- C. Spread only enough adhesive to permit installation of materials before initial set.
- D. Fit joints and butt seams tightly.
- E. Set flooring in place, press with heavy roller to attain full adhesion.
- F. Where type of floor finish, pattern, or color are different on opposite sides of door, terminate flooring under centerline of door.
- G. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated.
- H. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.

3.03 INSTALLATION - RESILIENT BASE

- A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints.

- B. Install base on solid backing. Bond tightly to wall and floor surfaces.

3.04 CLEANING

- A. Remove excess adhesive from floor, base, and wall surfaces without damage.
- B. Clean in accordance with manufacturer's written instructions.

END OF SECTION 09 65 00

SECTION 09 91 23
INTERIOR PAINTING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface preparation.
- B. Field application of paints, stains, and varnishes.
- C. Scope: Finish interior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated.
 - 1. Mechanical and Electrical:
 - a. In finished areas, paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, mechanical equipment, and electrical equipment, unless otherwise indicated.
- D. Do Not Paint or Finish the Following Items:
 - 1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
 - 2. Items indicated to receive other finishes.
 - 3. Items indicated to remain unfinished.
 - 4. Fire rating labels, equipment serial number and capacity labels, bar code labels, and operating parts of equipment.
 - 5. Floors, unless specifically indicated.
 - 6. Glass.
 - 7. Concealed pipes, ducts, and conduits.

1.02 REFERENCE STANDARDS

- A. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Current Edition, www.paintinfo.com.

1.03 SUBMITTALS

- A. Product Data: Provide complete list of products to be used, with the following information for each:
 - 1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
 - 2. MPI product number (e.g. MPI #47).
 - 3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
- B. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches in size, illustrating range of colors available for each finishing product specified.
 - 1. Where sheen is specified, submit samples in only that sheen.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.05 FIELD CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

- C. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Provide paints and finishes used in any individual system from the same manufacturer; no exceptions.

2.02 PAINTS AND FINISHES - GENERAL

- A. Paints and Finishes: Ready mixed, unless intended to be a field-catalyzed paint.
 - 1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
 - 2. Supply each paint material in quantity required to complete entire project's work from a single production run.
 - 3. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.
- B. Colors: To be selected from manufacturer's full range of available colors.
 - 1. Selection to be made by Architect after award of contract.
 - 2. In finished areas, finish pipes, ducts, conduit, and equipment the same color as the wall/ceiling they are mounted on/under.

2.03 PAINT SYSTEMS - INTERIOR

PART 3 EXECUTION

3.01 PREPARATION

- A. Clean surfaces thoroughly and correct defects prior to application.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.
- D. Seal surfaces that might cause bleed through or staining of topcoat.
- E. Concrete:
- F. Gypsum Board: Fill minor defects with filler compound. Spot prime defects after repair.

3.02 APPLICATION

- A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- B. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".
- C. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- D. Apply each coat to uniform appearance in thicknesses specified by manufacturer.
- E. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- F. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

END OF SECTION 09 91 23

SECTION 10 14 00
SIGNAGE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Room and door signs.

1.02 REFERENCE STANDARDS

- A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.
- B. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- C. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2009.

1.03 SUBMITTALS

- A. Product Data: Manufacturer's printed product literature for each type of sign, indicating sign styles, font, foreground and background colors, locations, overall dimensions of each sign.
- B. Samples: Submit two samples of each type of sign, of size similar to that required for project, illustrating sign style, font, and method of attachment.
- C. Selection Samples: Where colors are not specified, submit two sets of color selection charts or chips.

1.04 QUALITY ASSURANCE

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

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Package signs as required to prevent damage before installation.
- B. Package room and door signs in sequential order of installation, labeled by floor or building.
- C. Store tape adhesive at normal room temperature.

1.06 FIELD CONDITIONS

- A. Do not install tape adhesive when ambient temperature is lower than recommended by manufacturer.
- B. Maintain this minimum temperature during and after installation of signs.

PART 2 PRODUCTS

2.01 SIGNAGE APPLICATIONS

- A. Accessibility Compliance: Signs are required to comply with ADA Standards and ICC A117.1, unless otherwise indicated; in the event of conflicting requirements, comply with the most comprehensive and specific requirements.
- B. Room and Door Signs: Provide a sign for every doorway, whether it has a door or not, not including corridors, lobbies, and similar open areas.
 - 1. Sign Type: Flat signs with engraved panel media as specified.
 - 2. Provide "tactile" signage, with letters raised minimum 1/32 inch and Grade II braille.
 - 3. Character Height: 1 inch.
 - 4. Sign Height: 2 inches, unless otherwise indicated.
 - 5. Office Doors: Identify with room numbers to be determined later, not the numbers indicated on drawings; in addition, provide "window" section for replaceable occupant name.
 - 6. Conference and Meeting Rooms: Identify with room numbers to be determined later, not the numbers indicated on drawings; in addition, provide "window" section with sliding "In Use/Vacant" indicator.
 - 7. Service Rooms: Identify with room names and numbers to be determined later, not those indicated on drawings.

8. Rest Rooms: Identify with pictograms, the names "MEN" and "WOMEN", room numbers to be determined later, and braille.

2.02 SIGN TYPES

- A. Flat Signs: Signage media without frame.
 1. Edges: Square.
 2. Corners: Square.
 3. Clear Cover: For customer produced sign media, provide clear cover of polycarbonate plastic, glossy on back, non-glare on front.
 4. Wall Mounting of One-Sided Signs: Tape adhesive.
- B. Color and Font: Unless otherwise indicated:
 1. Character Font: Helvetica, Arial, or other sans serif font.
 2. Character Case: Upper case only.
 3. Background Color: Clear.
 4. Character Color: Contrasting color.

2.03 TACTILE SIGNAGE MEDIA

- A. Engraved Panels: Laminated colored plastic; engraved through face to expose core as background color:
 1. Total Thickness: 1/16 inch.

2.04 ACCESSORIES

- A. Tape Adhesive: Double sided tape, permanent adhesive.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate surfaces are ready to receive work.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install neatly, with horizontal edges level.
- C. Locate signs and mount at heights indicated on drawings and in accordance with ADA Standards and ICC A117.1.
- D. Protect from damage until Substantial Completion; repair or replace damaged items.

END OF SECTION 10 14 00

SECTION 10 22 33
ACCORDION FOLDING PARTITIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Accordion folding partitions.
- B. Track, ceiling guards, and operating hardware.

1.02 REFERENCE STANDARDS

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2016.
- B. ASTM E557 - Standard Guide for Architectural Design and Installation Practices for Sound Isolation between Spaces Separated by Operable Partitions; 2012.
- C. ASTM F793/F793M - Standard Classification of Wall Coverings by Use Characteristics; 2015.

1.03 SUBMITTALS

- A. Product Data: Provide data on partition operation, hardware and accessories, track switching components, colors and finishes available.
- B. Shop Drawings: Indicate opening sizes, track layout, details of track and required supports, static and dynamic loads, adjacent construction and finish trim, and stacking sizes.

1.04 QUALITY ASSURANCE

- A. Design Requirements: Design partition track and anchors to support imposed loads with maximum deflection of 1/360 of span, attached to structural members indicated.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers:
 - 1. Panelfold, Inc: www.panelfold.com/#sle.

2.02 ACCORDION FOLDING PARTITIONS

- A. Partition Construction: Non-acoustical.
 - 1. Frame: ____ gage, ____ inch steel pantograph hinge plates; ____ inch diameter vertical rods, galvanized.
 - 2. Surfacing: 22 gage, 0.0299 inch steel panels with sound absorbent liner.
 - 3. Finish: Vinyl coated fabric; color to be selected.
 - 4. Trim: Jamb mullions.
 - 5. Ceiling guard.
 - 6. Manual operation.
- B. Track: Formed steel; 1-1/4 by 1-1/4 inches size; thickness and profile designed to support loads; steel sub-channel.
- C. Carriers: Nylon wheels on trolley carrier at top center of every second fold, with threaded pendant bolt for vertical adjustment.

2.03 FINISH MATERIALS

- A. Vinyl Coated Fabric: ASTM F793 Category VI, polyvinyl fluoride finish.
 - 1. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84.
 - 2. Color: As selected from manufacturer's standard range.

2.04 COMPONENTS

- A. Trim: Aluminum moldings, clear anodized.
- B. Ceiling Guard: Formed sheet steel, full width of partition when stacked; baked enamel finish; color as selected.

- C. Hardware: Latching door handles of cast steel, satin chrome finish; master keyed to building keying system; jamb lock and pull bars.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that field measurements are as indicated.
- C. Verify track supports are laterally braced and will permit track to be leveled within 1/4 inch of required position and parallel to the floor surface.
- D. Verify floor flatness of 1/8 in 10 feet, non-cumulative.
- E. Verify wall plumbness of 1/8 in 10 feet, non-cumulative.

3.02 INSTALLATION

- A. Install partition in accordance with manufacturer's instructions and ASTM E557.
- B. Fit and align partition assembly level and plumb.
- C. Lubricate moving components.

3.03 ADJUSTING

- A. Adjust partition assembly to provide smooth operation from stacked to full open position.
- B. Visually inspect partition in full open position for light leaks to identify a potential acoustical leak. Adjust to achieve light tight seal.

3.04 CLOSEOUT ACTIVITIES

- A. Demonstrate operation of partition and identify potential operational problems.

END OF SECTION 10 22 33

**SECTION 10 26 01
WALL AND CORNER GUARDS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Corner guards.

1.02 REFERENCE STANDARDS

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2016.

1.03 SUBMITTALS

- A. Product Data: Indicate physical dimensions, features, anchorage details, and rough-in measurements.

PART 2 PRODUCTS

2.01 COMPONENTS

- A. Corner Guards - Surface Mounted:
 1. Material: High impact vinyl with full height extruded aluminum retainer.
 2. Performance: Resist lateral impact force of 100 lbs at any point without damage or permanent set.
 3. Surface Burning Characteristics: Provide assemblies with flame spread index of 25 or less and smoke developed index of 450 or less, when tested in accordance with ASTM E84.
 4. Width of Wings: 2 inches.
 5. Corner: Square.
 6. Color: As selected from manufacturer's standard colors.
 7. Length: One piece.
 8. Preformed end caps.

2.02 FABRICATION

- A. Fabricate components with tight joints, corners and seams.
- B. Form end trim closure by capping and finishing smooth.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install components in accordance with manufacturer's instructions, level and plumb, secured rigidly in position to wall framing members only.
- B. Position corner guard 4 inches above finished floor (top of Base) to 48 inches high.

END OF SECTION 10 26 01

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SECTION 10 28 00
TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Commercial toilet accessories.
- B. Commercial shower and bath accessories.
- C. Utility room accessories.

1.02 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. ASTM A269/A269M - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service; 2015a.
- C. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
- D. ASTM C1036 - Standard Specification for Flat Glass; 2016.
- E. ASTM C1503 - Standard Specification for Silvered Flat Glass Mirror; 2008 (Reapproved 2013).

1.03 SUBMITTALS

- A. Product Data: Submit data on accessories describing size, finish, details of function, and attachment methods.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.
- B. Stainless Steel Sheet: ASTM A666, Type 304.
- C. Stainless Steel Tubing: ASTM A269/A269M, Grade TP304 or TP316.
- D. Mirror Glass: Annealed float glass, ASTM C1036 Type I, Class 1, Quality Q2, with silvering, protective and physical characteristics complying with ASTM C1503.
- E. Fasteners, Screws, and Bolts: Hot dip galvanized; tamper-proof; security type.

2.02 FINISHES

- A. Stainless Steel: Satin finish, unless otherwise noted.

2.03 COMMERCIAL TOILET ACCESSORIES

- A. Toilet Paper Dispenser: Double roll, surface mounted, for coreless type rolls.
- B. Paper Towel Dispenser: Folded paper type, stainless steel, surface-mounted, with viewing slots on sides as refill indicator and tumbler lock.
 - 1. Capacity: 300 C-fold minimum.
- C. Soap Dispenser: Liquid soap dispenser, wall-mounted, surface, with stainless steel cover and horizontal stainless steel tank and working parts; push type soap valve, check valve, and window gage refill indicator, tumbler lock.
 - 1. Minimum Capacity: 48 ounces.
- D. Mirrors: Stainless steel framed, 1/4 inch thick annealed float glass; ASTM C1036.
 - 1. Size: 24" x 36".
- E. Grab Bars: Stainless steel, nonslip grasping surface finish.
 - 1. Standard Duty Grab Bars:
 - a. Push/Pull Point Load: 250 pound-force, minimum.
 - b. Dimensions: 1-1/4 inch outside diameter, minimum 0.05 inch wall thickness, concealed flange mounting, 1-1/2 inch clearance between wall and inside of grab bar.

- c. Length and Configuration: As indicated on drawings.

2.04 COMMERCIAL SHOWER AND BATH ACCESSORIES

- A. Shower Curtain Rod: Stainless steel tube, 1 inch outside diameter, 0.04 inch wall thickness, satin-finished, with 3 inch outside diameter, minimum 0.04 inch thick satin-finished stainless steel flanges, for concealed mounting.
- B. Shower Curtain:
 - 1. Material: Nylon reinforced vinyl, 0.008 inch thick, matte finish, with antibacterial treatment, flameproof and stain-resistant.
 - 2. Size: 36 by 72 inches, hemmed edges.
 - 3. Grommets: Stainless steel; pierced through top hem on 6 inch centers.
 - 4. Color: As selected from manufacturer's standard colors.
- C. Folding Shower Seat: Wall-mounted surface; welded tubular seat frame, structural support members, hinges and mechanical fasteners of Type 304 stainless steel, L-shaped, right hand and rectangular seat.
 - 1. Size: ADA Standards compliant.
- D. Robe Hook: Heavy-duty stainless steel, single-prong, rectangular-shaped bracket and backplate for concealed attachment, satin finish.

2.05 UTILITY ROOM ACCESSORIES

- A. Combination Utility Shelf/Mop and Broom Holder: 0.05 inch thick stainless steel, Type 304, with 1/2 inch returned edges, 0.06 inch steel wall brackets.
 - 1. Hooks: 3, 0.06 inch stainless steel rag hooks at shelf front.
 - 2. Mop/broom holders: 3 spring-loaded rubber cam holders at shelf front.
 - 3. Length: Manufacturer's standard length for number of holders/hooks.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify exact location of accessories for installation.

3.02 INSTALLATION

- A. Install accessories in accordance with manufacturers' instructions in locations indicated on drawings.
- B. Install plumb and level, securely and rigidly anchored to substrate.
- C. Mounting Heights: As required by accessibility regulations, unless otherwise indicated.
 - 1. Grab Bars: As indicated on drawings.
 - 2. Mirrors: 24" x 36", measured to bottom of mirrored surface.
 - 3. Other Accessories: As indicated on drawings.

3.03 PROTECTION

- A. Protect installed accessories from damage due to subsequent construction operations.

END OF SECTION 10 28 00

SECTION 10 44 00
FIRE PROTECTION SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fire extinguishers.
- B. Fire extinguisher cabinets.
- C. Accessories.

1.02 REFERENCE STANDARDS

- A. FM (AG) - FM Approval Guide; current edition.
- B. NFPA 10 - Standard for Portable Fire Extinguishers; 2013.
- C. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.

1.03 SUBMITTALS

- A. Product Data: Provide extinguisher operational features.
- B. Shop Drawings: Indicate locations of cabinets and cabinet physical dimensions.

1.04 FIELD CONDITIONS

- A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

PART 2 PRODUCTS

2.01 FIRE EXTINGUISHERS

- A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.
 - 1. Provide extinguishers labeled by UL (DIR) or FM (AG) for purpose specified and as indicated.

2.02 FIRE EXTINGUISHER CABINETS

- A. Cabinet Construction: Non-fire rated.
 - 1. Formed primed steel sheet; 0.036 inch thick base metal.
- B. Cabinet Configuration: Semi-recessed type.
 - 1. Size to accommodate accessories.
- C. Door: 0.036 inch metal thickness, reinforced for flatness and rigidity with nylon catch. Hinge doors for 180 degree opening with two butt hinge.
- D. Finish of Cabinet Exterior Trim and Door: Baked enamel, color as selected.
- E. Finish of Cabinet Interior: White colored enamel.

2.03 ACCESSORIES

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify rough openings for cabinet are correctly sized and located.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install cabinets plumb and level in wall openings,
- C. Secure rigidly in place.
- D. Place extinguishers in cabinets.

END OF SECTION 10 44 00

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SECTION 10 51 00
LOCKERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Solid plastic lockers.
- B. Locker benches.

1.02 REFERENCE STANDARDS

- A. NFPA 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth; 2015.

1.03 SUBMITTALS

- A. Product Data: Manufacturer's published data on locker construction, sizes and accessories.
- B. Shop Drawings: Indicate locker plan layout, numbering plan and combination lock code.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Protect locker finish and adjacent surfaces from damage.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Solid Plastic Lockers:

2.02 LOCKER APPLICATIONS

- A. Wardrobe Lockers: Single tier solid plastic (HDPE) lockers, free-standing with matching closed base.
 - 1. Width: 15 inches.
 - 2. Depth: 12 inches.
 - 3. Height: 72 inches.
 - 4. Fittings: Hat shelf, 2 coat hooks.
 - 5. Locking: Padlock hasps, for padlocks provided by Owner.
 - 6. Provide sloped top.
- B. Locker Benches: Stationary type; bench top of laminated birch; satin stainless steel pedestals.
 - 1. Height: as shown.
 - 2. Length: as shown.

2.03 SOLID PLASTIC LOCKERS

- A. Lockers: Factory assembled, made of high density polyethylene (HDPE) panels, tested in accordance with NFPA 286, homogenous color throughout, with mortise and tenon joints with stainless steel fasteners or heat fused joints.
 - 1. Doors: Full overlay without frame.
 - 2. Where locker ends or sides are exposed, provide same finish as fronts or provide extra panels to match fronts.
 - 3. Ventilation: By open space between the back of the door and locker body.
 - 4. Provide filler strips where indicated, securely attached to lockers.
 - 5. Door Color: To be selected by Architect.
 - 6. Body Color: Selected from Manufacturer's standard colors.
- B. Component Thicknesses:
 - 1. Doors: 1/2 inch minimum thickness.
 - 2. Locker Body: Tops, bottoms, backs, and shelves 3/8 inch minimum.
 - 3. End Panels and Filler Panels: 1/2 inch minimum thickness.
 - 4. Sloped Tops: 1/2 inch minimum thickness.
 - 5. Toe Kick Plates: 1/2 inch minimum thickness.

- C. Solid Plastic Panels: High Density polyethylene (HDPE) formed under high pressure into solid plastic components.
- D. Hinges: Full height of locker, manufacturer's standard heavy duty type.
- E. Coat Hooks: Stainless steel; attached with tamperproof screws.
- F. Number Plates: Provide rectangular shaped aluminum plates. Form numbers 1 inch high of block font style with ADA designation, in contrasting color.
- G. Locks: Locker manufacturer's standard type of style indicated above.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install lockers plumb and square.
- C. Place and secure on prepared base.
- D. Secure lockers with anchor devices to suit substrate materials. Minimum Pullout Force: 100 lb.
- E. Bolt adjoining locker units together to provide rigid installation.
- F. Install end panels, filler panels, and sloped tops.
- G. Install accessories.
- H. Replace components that do not operate smoothly.

3.02 CLEANING

- A. Clean locker interiors and exterior surfaces.

END OF SECTION 10 51 00

**SECTION 12 36 00
COUNTERTOPS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Countertops for architectural cabinet work.
- B. Countertops for manufactured casework.
- C. Sinks molded into countertops.
- D. Epoxy resin sinks.

1.02 RELATED REQUIREMENTS

- A. Section 06 41 00 - Architectural Wood Casework.

1.03 REFERENCE STANDARDS

- A. ASTM D635 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position; 2014.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2016.
- C. IAPMO Z124 - Plastic Plumbing Fixtures; 2017.
- D. ISFA 2-01 - Classification and Standards for Solid Surfacing Material; 2013.
- E. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.

1.04 SUBMITTALS

- A. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Specimen warranty.
- B. Shop Drawings: Complete details of materials and installation; combine with shop drawings of cabinets and casework specified in other sections.
- C. Selection Samples: For each finish product specified, color chips representing manufacturer's full range of available colors and patterns.
- D. Test Reports: Chemical resistance testing, showing compliance with specified requirements.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.07 FIELD CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 PRODUCTS

2.01 COUNTERTOPS

- A. Plastic Laminate Countertops: High-pressure decorative laminate (HPDL) sheet bonded to substrate.
 - 1. Laminate Sheet: NEMA LD 3, Grade HGS, 0.048 inch nominal thickness.
 - a. Finish: Matte or suede, gloss rating of 5 to 20.

- b. Surface Color and Pattern: As selected by Architect from the manufacturer's full line.
 - 2. Back and End Splashes: Same material, same construction.
- B. Chemical-Resistant Plastic Laminate Countertops: Chemical-resistant high-pressure decorative laminate (HPDL) sheet bonded to substrate.
 - 1. Laminate Sheet: NEMA LD 3 Grade HGL, 0.039 inch nominal thickness.
 - a. Finish: Matte or suede, gloss rating of 5 to 20.
 - b. Surface Color and Pattern: As selected by Architect from manufacturer's full line.
 - 2. Back and End Splashes: Same material, same construction; minimum 4 inches high.
- C. Epoxy Resin Countertops: Filled epoxy resin molded into homogenous, non-porous sheets; no surface coating and color and pattern consistent throughout thickness; with integral or adhesively seamed components.
 - 1. Flat Surface Thickness: 1 inch, nominal.
 - 2. Flammability: Self-extinguishing, when tested in accordance with ASTM D635.
 - 3. Surface Finish: Smooth, non-glare.
 - 4. Color: as selected.
 - 5. Exposed Edge Shape: 3/16 inch radius corner.
 - 6. Back and End Splashes: Same material, same thickness; separate for field attachment.
 - 7. Sinks: Same material, same color; integrally molded with counter; bottom sloped to outlet; molded outlets; drain outlet located in back corner.
 - a. Sides and Ends: 1/2 inch minimum thickness.
 - b. Bottoms: 5/8 inch minimum thickness.
 - c. Interior Corners: 1 inch minimum radius.
 - d. Clamping collars for 1-1/2 or 2 inch diameter waste pipe, for sealed but not permanent connection.
 - e. Steel channel supports front to back on each side, fastened to underside of top to support twice full sink weight.
 - 8. Troughs: Same material; bottom sloped to outlet.
 - 9. Fabricate in accordance with manufacturer's standard requirements.
- D. Solid Surfacing Countertops: Solid surfacing sheet or plastic resin casting over continuous substrate.
 - 1. Flat Sheet Thickness: 1/4 inch, minimum.
 - 2. Solid Surfacing Sheet and Plastic Resin Castings: Complying with ISFA 2-01 and NEMA LD 3; acrylic or polyester resin, mineral filler, and pigments; homogenous, non-porous and capable of being worked and repaired using standard woodworking tools; no surface coating; color and pattern consistent throughout thickness.
 - a. Surface Burning Characteristics: Flame spread index of 25, maximum; smoke developed index of 450, maximum; when tested in accordance with ASTM E84.
 - b. Sinks and Bowls: Integral castings; minimum 3/4 inch wall thickness; comply with IAPMO Z124.
 - c. Finish on Exposed Surfaces: Matte, gloss rating of 5 to 20.
 - d. Color and Pattern: As selected by Architect from manufacturer's full line.
 - 3. Other Components Thickness: 1/2 inch, minimum.
 - 4. Back and End Splashes: Same sheet material, square top; minimum 4 inches high.
 - 5. Skirts: As indicated on drawings.
 - 6. Fabricate in accordance with manufacturer's standard requirements.

2.02 MATERIALS

- A. Adhesives: Chemical resistant waterproof adhesive as recommended by manufacturer of materials being joined.
- B. Joint Sealant: Mildew-resistant silicone sealant, white.

2.03 FABRICATION

- A. Fabricate tops and splashes in the largest sections practicable, with top surface of joints flush.
 - 1. Join lengths of tops using best method recommended by manufacturer.

2. Fabricate to overhang fronts and ends of cabinets 1 inch except where top butts against cabinet or wall.
 3. Prepare all cutouts accurately to size; replace tops having improperly dimensioned or unnecessary cutouts or fixture holes.
- B. Provide back/end splash wherever counter edge abuts vertical surface unless otherwise indicated.
1. Secure to countertop with concealed fasteners and with contact surfaces set in waterproof glue.
 2. Height: 4 inches, unless otherwise indicated.
- C. Solid Surfacing: Fabricate tops up to 144 inches long in one piece; join pieces with adhesive sealant in accordance with manufacturer's recommendations and instructions.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- C. Verify that wall surfaces have been finished and mechanical and electrical services and outlets are installed in proper locations.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

- A. Securely attach countertops to cabinets using concealed fasteners. Make flat surfaces level; shim where required.
- B. Attach plastic laminate countertops using screws with minimum penetration into substrate board of 5/8 inch.
- C. Attach epoxy resin countertops using compatible adhesive.
- D. Seal joint between back/end splashes and vertical surfaces.

3.04 TOLERANCES

- A. Variation From Horizontal: 1/8 inch in 10 feet, maximum.
- B. Offset From Wall, Countertops: 1/8 inch maximum; 1/16 inch minimum.
- C. Field Joints: 1/8 inch wide, maximum.

3.05 CLEANING

3.06 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION 12 36 00

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SECTION 260519

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

- 1. Building wires and cables rated 600 V and less.
- 2. Connectors, splices, and terminations rated 600 V and less.

- B. Related Requirements:

- 1. Section 260513 "Medium-Voltage Cables" for single-conductor and multiconductor cables, cable splices, and terminations for electrical distribution systems with 2001 to 35,000 V.
- 2. Section 260523 "Control-Voltage Electrical Power Cables" for control systems communications cables and Classes 1, 2 and 3 control cables.

1.3 DEFINITIONS

- A. VFC: Variable frequency controller.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Field quality-control reports.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Member company of NETA or an NRTL.
 - 1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following.
1. American Insulated Wire Corp.; a Leviton Company.
 2. Senator Wire & Cable Company.
 3. General Cable Technologies Corporation.
 4. Southwire Incorporated.
- B. Aluminum and Copper Conductors: Comply with NEMA WC 70/ICEA S-95-658.
- C. Conductor Insulation: Comply with NEMA WC 70/ICEA S-95-658 for Type THHN-2-THWN-2, Type XHHW-2 CT rated and Type SO.
- D. Multiconductor Cable: Comply with NEMA WC 70/ICEA S-95-658 for armored cable, Type AC metal-clad cable, Type MC mineral-insulated, metal-sheathed cable, Type MI nonmetallic-sheathed cable, Type NM Type SO and Type USE with ground wire.
- E. VFC Cable:
1. Comply with UL 1277, UL 1685, and NFPA 70 for Type TC-ER cable.
 2. Type TC-ER with oversized crosslinked polyethylene insulation, spiral-wrapped foil plus 85 percent coverage braided shields and insulated full-size ground wire] [dual spirally wrapped copper tape shields and three bare symmetrically applied ground wires, and sunlight- and oil-resistant outer PVC jacket.
 3. Comply with UL requirements for cables in Classes I and II, Division 2 hazardous location applications.

2.2 CONNECTORS AND SPLICES

- A. Manufacturers: Subject to compliance with requirements, provide products by the following
- B. Basis-of-Design Product: Subject to compliance with requirements, provide comparable product by one of the following:
1. AFC Cable Systems, Inc.
 2. Hubbell Power Systems, Inc.
 3. Tyco Electronics Corp.
 4. O-Z/Gedney; a brand of the EGS Electrical Group.
 5. 3M; Electrical Markets Division.
- C. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

2.3 SYSTEM DESCRIPTION

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

- B. Comply with NFPA 70.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders: Copper. All conductors number 12 AWG and larger shall be stranded.
- B. Branch Circuits: Copper. All conductors number 12 AWG and larger shall be stranded.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Service Entrance: Type THHN-2-THWN-2, single conductors in raceway.
- B. Feeders: Type THHN-2-THWN-2, single conductors in raceway.
- C. Branch circuits: THHN-THWN-2, single conductors in raceway.
- D. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, strain relief device at terminations to suit application.
- E. Multi-Wire Branch Circuits: install no more than three circuits in a raceway, unless specifically shown otherwise.
- F. Neutral Conductors: Provide one neutral conductor for each phase conductor. Shared neutral conductors are not allowed.
- G. Minimum Branch Circuit Conductor size: Provide the following minimum sizes for distances listed on 20A branch circuits to prevent excessive voltage drop. The circuit length shall be measured along the length of the conductor from the circuit breaker in the panelboard to the last device on the circuit. Increase raceway size to comply with conductor fill requirements of NFPA 70.
- H. Upsizing of Conductors
 - 1. Branch Circuit Voltage of 120V:
 - a. Circuit lengths less than 70 feet: Provide minimum #12 AWG conductor size.
 - b. Circuit lengths between 70 feet and 110 feet and/or where more than 3 current carrying conductors are installed in a single raceway: Provide minimum #10 AWG conductor size.
 - c. Circuit lengths between 110 feet and 170 feet: Provide minimum #8 AWG conductor size.
 - d. Circuit lengths greater than 170 feet: Perform voltage drop calculations and provide conductor size to keep branch circuit voltage drop less than 3% with a 15 amp load.
 - 2. Branch Circuit Voltage of 277V:
 - a. Circuit lengths less than 150 feet: Provide minimum #12 AWG conductor size.
 - b. Circuit lengths between 150 feet and 240 feet: Provide minimum #10 AWG conductor size.

- c. All lighting circuits feeding the gymnasium area: Provide minimum #10 AWG conductor size.
 - d. Circuit lengths between 240 feet and 380 feet: Provide minimum #8 AWG conductor size.
 - e. Circuit lengths greater than 380 feet: Perform voltage drop calculations and provide conductor size to keep branch circuit voltage drop less than 3% with a 15 amp load.
- I. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, strain relief device at terminations to suit application.
 - J. Class 1 and Class 2 Control Circuits: Type THHN-THWN-2, in raceway.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.
- B. Complete raceway installation between conductor and cable termination points according to Section 260533 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.
- C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- F. Support cables according to Section 260529 "Hangers and Supports for Electrical Systems."
- G. Complete cable tray systems installation according to Section 260536 "Cable Trays for Electrical Systems" prior to installing conductors and cables.
- H. Identify and color-code conductors and cables according to Division 26 Section "Identification for Electrical systems."

3.4 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.
- B. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than un-spliced conductors.
 - 1. Use oxide inhibitor in each splice, termination, and tap for aluminum conductors.
 - 2. Splices for No. 10 AWG and smaller shall be screw on type similar to Scotch or

- Ideal wing nut connectors.
3. Crimp on splices designed to be used without wire stripping shall not be acceptable.

- C. Wiring at Outlets: Install conductor at each outlet, with at least **12 inches (300 mm)** of slack.

3.5 IDENTIFICATION

- A. Identify and color-code conductors and cables according to Section 260553 "Identification for Electrical Systems."
- B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

3.6 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.7 FIRESTOPPING

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Section 078413 "Penetration Firestopping."

END OF SECTION 260519

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SECTION 260526

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes grounding and bonding systems and equipment.
- B. Section includes grounding and bonding systems and equipment, plus the following special applications:
 - 1. Underground distribution grounding.
 - 2. Ground bonding common with lightning protection system.
 - 3. Foundation steel electrodes.

1.3 SUBMITTALS

- A. Qualification Data: For testing agency and testing agency's field supervisor.
- B. Field quality-control reports.

1.4 QUALITY ASSURANCE

- A. Comply with NFPA 70 for grounding and bonding of electrical systems.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Comply with UL 467 for grounding and bonding materials and equipment.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following
 - 1. Burndy; Part of Hubbell Electrical Systems.
 - 2. Dossert; AFL Telecommunications LLC.
 - 3. ERICO International Corporation.

4. Fushi Copperweld Inc.
5. Galvan Industries, Inc.; Electrical Products Division, LLC.
6. Harger Lightning and Grounding.
7. ILSCO.
8. O-Z/Gedney; A Brand of the EGS Electrical Group.
9. Robbins Lightning, Inc.
10. Siemens Power Transmission & Distribution, Inc.

2.2 SYSTEM DESCRIPTION

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with UL 467 for grounding and bonding materials and equipment.

2.3 CONDUCTORS

- A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
- B. Bare Copper Conductors:
 1. Solid Conductors: ASTM B 3.
 2. Stranded Conductors: ASTM B 8.
 3. Tinned Conductors: ASTM B 33.
 4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch (6 mm) in diameter.
 5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
 6. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.
 7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.
- C. Grounding Bus: Predrilled rectangular bars of annealed copper, **1/4 by 4 inches (6.3 by 100 mm)** in cross section, with 9/32-inch (7.14-mm) holes spaced 1-1/8 inches (28 mm) apart. Stand-off insulators for mounting shall comply with UL 891 for use in switchboards, 600 V and shall be Lexan or PVC, impulse tested at 5000 V.

2.4 CONNECTORS

- A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.
- B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy.
- C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.
- D. Bus-Bar Connectors: Mechanical type, cast silicon bronze, solderless compression -type wire terminals, and long-barrel, two-bolt connection to ground bus bar.

2.5 GROUNDING ELECTRODES

- A. Ground Rods: Copper-clad steel, 3/4 inch by 10 feet (19 mm by 3 m) in diameter.
- B. Retain "Chemical-Enhanced Grounding Electrodes" Paragraph below if allowed by authorities having jurisdiction to enhance grounding performance. See Evaluations.
- C. Chemical-Enhanced Grounding Electrodes: Copper tube, straight or L-shaped, charged with nonhazardous electrolytic chemical salts.
 - 1. Termination: Factory-attached No. 4/0 AWG bare conductor at least 48 inches (1200 mm) long.
 - 2. Backfill Material: Electrode manufacturer's recommended material.

PART 3 - EXECUTION

3.1 APPLICATIONS

- A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.
- B. Underground Grounding Conductors: Install two bare tinned-copper conductor, 4/0 AWG minimum.
 - 1. Bury at least 35 inches below grade.
 - 2. Duct-Bank Grounding Conductor: Bury 12 inches (300 mm) above duct bank when indicated as part of duct-bank installation.
- C. Isolated Grounding Conductors: Green-colored insulation with continuous yellow stripe. On feeders with isolated ground, identify grounding conductor where visible to normal inspection, with alternating bands of green and yellow tape, with at least three bands of green and two bands of yellow.
- D. Grounding Bus: Install in electrical equipment rooms, in rooms housing service equipment, and elsewhere as indicated.
 - 1. Install bus horizontally, on insulated spacers 2 inches (50 mm) minimum from wall, 6 inches (150 mm) above finished floor unless otherwise indicated.
 - 2. Where indicated on both sides of doorways, route bus up to top of door frame, across top of doorway, and down; connect to horizontal bus.
- E. Conductor Terminations and Connections:
 - 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
 - 2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
 - 3. Connections to Ground Rods at Test Wells: Bolted connectors.
 - 4. Connections to Structural Steel: Welded connectors.

3.2 GROUNDING AT THE SERVICE

- A. Equipment grounding conductors and grounding electrode conductors shall be connected to the ground bus. Install a main bonding jumper between the neutral and ground buses.

3.3 GROUNDING SEPARATELY DERIVED SYSTEMS

- A. Generator: Install grounding electrode(s) at the generator location. The electrode shall be connected to the equipment grounding conductor and to the frame of the generator.

3.4 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with all feeders and branch circuits.
- B. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:
 - 1. Feeders and branch circuits.
 - 2. Lighting circuits.
 - 3. Receptacle circuits.
 - 4. Single-phase motor and appliance branch circuits.
 - 5. Three-phase motor and appliance branch circuits.
 - 6. Flexible raceway runs.
 - 7. Armored and metal-clad cable runs.
 - 8. Busway Supply Circuits: Install insulated equipment grounding conductor from grounding bus in the switchgear, switchboard, or distribution panel to equipment grounding bar terminal on busway.
 - 9. X-Ray Equipment Circuits: Install insulated equipment grounding conductor in circuits supplying x-ray equipment.
- C. Isolated Grounding Receptacle Circuits: Install an insulated equipment grounding conductor connected to the receptacle grounding terminal. Isolate conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service unless otherwise indicated.
- D. Isolated Equipment Enclosure Circuits: For designated equipment supplied by a branch circuit or feeder, isolate equipment enclosure from supply circuit raceway with a nonmetallic raceway fitting listed for the purpose. Install fitting where raceway enters enclosure, and install a separate insulated equipment grounding conductor. Isolate conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service unless otherwise indicated.

3.5 INSTALLATION

- A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- B. Ground Rods: Drive rods until tops are 2 inches (50 mm) below finished floor or final grade unless otherwise indicated.

1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
 2. For grounding electrode system, install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.
- C. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.
1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
 2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
 3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.
- D. Grounding and Bonding for Piping:
1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange by using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
 2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
 3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.
- E. Grounding for Steel Building Structure: Install a driven ground rod at base of each corner column and at intermediate exterior columns at distances not more than 60 feet (18 m) apart.

3.6 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.
- B. Perform tests and inspections.
1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- C. Tests and Inspections:
1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
 2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.

3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, and at individual ground rods. Make tests at ground rods before any conductors are connected.
 - a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
 - b. Perform tests by fall-of-potential method according to IEEE 81.
- D. Grounding system will be considered defective if it does not pass tests and inspections.
- E. Report measured ground resistances that exceed the following values:
 1. Power and Lighting Equipment or System with Capacity of 500 kVA and Less: 10 ohms.
 2. Power and Lighting Equipment or System with Capacity of 500 to 1000 kVA: 5 ohms.
 3. Power and Lighting Equipment or System with Capacity More Than 1000 kVA: 3 ohms.
 4. Power Distribution Units or Panelboards Serving Electronic Equipment: 3 ohm(s).
 5. Substations and Pad-Mounted Equipment: 5 ohms.
 6. Manhole Grounds: 10 ohms.
- F. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

END OF SECTION 260526

SECTION 260529

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Hangers and supports for electrical equipment and systems.
 - 2. Construction requirements for concrete bases.
- B. Related Sections include the following:
 - 1. Section 260548 "Vibration and Seismic Controls for Electrical Systems" for products and installation requirements necessary for compliance with seismic criteria.

1.3 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. IMC: Intermediate metal conduit.
- C. RMC: Rigid metal conduit.

1.4 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design supports for multiple raceways, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.
- C. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
- D. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed for this Project, with a minimum structural safety factor of five times the applied force.

1.5 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Steel slotted support systems.
- B. Shop Drawings: Signed and sealed by a qualified professional engineer. Show fabrication and installation details and include calculations for the following:
 - 1. Trapeze hangers. Include Product Data for components.
 - 2. Steel slotted channel systems. Include Product Data for components.
 - 3. Equipment supports.

1.6 INFORMATIONAL SUBMITTALS

- A. Welding certificates.

1.7 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Comply with NFPA 70.

1.8 COORDINATION

- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified together with concrete Specifications.

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Allied Tube & Conduit.
 - b. Cooper B-Line, Inc.; a division of Cooper Industries.
 - c. ERICO International Corporation.
 - d. GS Metals Corp.
 - e. Thomas & Betts Corporation.
 - f. Unistrut; Tyco International, Ltd.
 - g. Wesanco, Inc.
 - 2. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
 - 3. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.

4. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
 5. Channel Dimensions: Selected for applicable load criteria.
- B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.
- C. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- D. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.
- E. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
- F. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Hilti Inc.
 - 2) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
 - 3) MKT Fastening, LLC.
 - 4) Simpson Strong-Tie Co., Inc.; Masterset Fastening Systems Unit.
 2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Cooper B-Line, Inc.; a division of Cooper Industries.
 - 2) Empire Tool and Manufacturing Co., Inc.
 - 3) Hilti Inc.
 - 4) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
 - 5) MKT Fastening, LLC.
 3. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
 4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
 5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
 6. Toggle Bolts: All-steel springhead type.
 7. Hanger Rods: Threaded steel.

2.2 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

- A. Description: Welded or bolted, structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.
- B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as scheduled in NECA 1, where its Table 1 lists maximum spacings less than stated in NFPA 70. Minimum rod size shall be 1/4 inch (6 mm) in diameter.
- C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted, sized so capacity can be increased by at least 50 percent in future without exceeding specified design load limits.
 - 1. Secure raceways and cables to these supports with two-bolt conduit clamps.
- D. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch (38-mm) and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

3.2 SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.
- B. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb (90 kg).
- C. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
 - 1. To Wood: Fasten with lag screws or through bolts.
 - 2. To New Concrete: Bolt to concrete inserts.
 - 3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
 - 4. To Existing Concrete: Expansion anchor fasteners.
 - 5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches (100 mm) thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches (100 mm) thick.
 - 6. To Steel: Welded threaded studs complying with AWS D1.1/D1.1M, with lock washers and nuts To Light Steel: Sheet metal screws.

7. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate by means that meet seismic-restraint strength and anchorage requirements.
- D. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

- A. Comply with installation requirements in Section 055000 "Metal Fabrications" for site-fabricated metal supports.
- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
- C. Field Welding: Comply with AWS D1.1/D1.1M.

3.4 CONCRETE BASES

- A. Construct concrete bases of dimensions indicated but not less than 4 inches (100 mm) larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.
- B. Use **3000-psi (20.7-MPa)**, 28-day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements are specified in Section 033000 "Cast-in-Place Concrete." Anchor equipment to concrete base.
 1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 2. Install anchor bolts to elevations required for proper attachment to supported equipment.
 3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

3.5 PAINTING

- A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
 1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils (0.05 mm).
- B. Touchup: Comply with requirements in Section 099113 "Exterior Painting" for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.
- C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 260529

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SECTION 260533

RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Metal conduits, tubing, and fittings.
 - 2. Nonmetal conduits, tubing, and fittings.
 - 3. Metal wireways and auxiliary gutters.
 - 4. Surface raceways.
 - 5. Boxes, enclosures, and cabinets.
 - 6. .

1.3 DEFINITIONS

- A. GRC: Galvanized rigid steel conduit.
- B. IMC: Intermediate metal conduit.

1.4 ACTION SUBMITTALS

- A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.
- B. LEED Submittals:
 - 1. Product Data for Credit IEQ 4.1: For solvent cements and adhesive primers, documentation including printed statement of VOC content.
 - 2. Laboratory Test Reports for Credit IEQ 4: For solvent cements and adhesive primers, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- C. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.
 - 1. Custom enclosures and cabinets.

- D. Samples: For wireways nonmetallic wireways and surface raceways and for each color and texture specified, 12 inches (300 mm) long.

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of items involved:
 - 1. Structural members in paths of conduit groups with common supports.
 - 2. HVAC and plumbing items and architectural features in paths of conduit groups with common supports.
- B. Qualification Data: For professional engineer.
- C. Seismic Qualification Certificates: For enclosures, cabinets, and conduit racks and their mounting provisions, including those for internal components, from manufacturer.
 - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
 - 4. Detailed description of conduit support devices and interconnections on which the certification is based and their installation requirements.
- D. Source quality-control reports.

PART 2 - PRODUCTS

2.1 METAL CONDUITS, TUBING, AND FITTINGS

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - 1. AFC Cable Systems, Inc.
 - 2. Allied Tube & Conduit.
 - 3. Anamet Electrical, Inc.
 - 4. Electri-Flex Company.
 - 5. O-Z/Gedney.
 - 6. Southwire Company.
 - 7. Thomas & Betts Corporation.
 - 8. Western Tube and Conduit Corporation.
 - 9. Wheatland Tube Company.
- B. Listing and Labeling: Metal conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. GRC: Comply with ANSI C80.1 and UL 6.
- D. IMC: Comply with ANSI C80.6 and UL 1242.
- E. PVC-Coated Steel Conduit: PVC-coated rigid steel conduit.

1. Comply with NEMA RN 1.
 2. Coating Thickness: 0.040 inch (1 mm), minimum.
- F. EMT: Comply with ANSI C80.3 and UL 797.
- G. FMC: Comply with UL 1; zinc-coated steel.
- H. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.
- I. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.
1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886 and NFPA 70.
 2. Fittings for EMT:
 - a. Material: Steel die cast.
 - b. Type: Setscrew.
 3. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.
 4. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch (1 mm), with overlapping sleeves protecting threaded joints.
- J. Joint Compound for IMC, GRC, or ARC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 NONMETALLIC CONDUITS, TUBING, AND FITTINGS

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
1. AFC Cable Systems, Inc.
 2. Anamet Electrical, Inc.
 3. Arnco Corporation.
 4. CANTEX Inc.
 5. CertainTeed Corporation.
 6. Condux International, Inc.
 7. Electri-Flex Company.
 8. Kraloy.
 9. Lamson & Sessions; Carlon Electrical Products.
 10. Niedax-Kleinhuis USA, Inc.
 11. RACO; Hubbell.
 12. Thomas & Betts Corporation.
- B. Listing and Labeling: Nonmetallic conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. RNC: Type EPC-40-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.
- D. Rigid HDPE: Comply with UL 651A.
- E. Continuous HDPE: Comply with UL 651B.

- F. Coilable HDPE: Preassembled with conductors or cables, and complying with ASTM D 3485.
- G. RTRC: Comply with UL 1684A and NEMA TC 14.
- H. Fittings for RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.
- I. Solvent cements and adhesive primers shall have a VOC content of 510 and 550 g/L or less, respectively, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.3 METAL WIREWAYS AND AUXILIARY GUTTERS

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - 1. Cooper B-Line, Inc.
 - 2. Hoffman.
 - 3. Square D.
- B. Description: Sheet metal, complying with UL 870 and NEMA 250, Type 1 unless otherwise indicated, and sized according to NFPA 70.
 - 1. Metal wireways installed outdoors shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.
- D. Wireway Covers: Hinged type unless otherwise indicated.
- E. Finish: Manufacturer's standard enamel finish.

2.4 BOXES, ENCLOSURES, AND CABINETS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following
 - 1. Cooper Technologies Company; Cooper Crouse-Hinds.
 - 2. EGS/Appleton Electric.
 - 3. Erickson Electrical Equipment Company.
 - 4. Hoffman.
 - 5. Hubbell Incorporated.
 - 6. Milbank Manufacturing Co.
 - 7. Mono-Systems, Inc.
 - 8. O-Z/Gedney.
 - 9. RACO; Hubbell.
 - 10. Robroy Industries.
 - 11. Spring City Electrical Manufacturing Company.
 - 12. Stahlin Non-Metallic Enclosures.
 - 13. Thomas & Betts Corporation.
 - 14. Wiremold / Legrand.
- B. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.

- C. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.
- D. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, aluminum, Type FD, with gasketed cover.
- E. Metal Floor Boxes:
 - 1. Material: Cast metal.
 - 2. Type: Fully adjustable.
 - 3. Shape: Rectangular.
 - 4. Listing and Labeling: Metal floor boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- F. Nonmetallic Floor Boxes: Nonadjustable, round or rectangular.
 - 1. Listing and Labeling: Nonmetallic floor boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- G. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb (23 kg). Outlet boxes designed for attachment of luminaires weighing more than 50 lb (23 kg) shall be listed and marked for the maximum allowable weight.
- H. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- I. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, cast aluminum with gasketed cover.
- J. Box extensions used to accommodate new building finishes shall be of same material as recessed box.
- K. Device Box Dimensions: 4 inches square by 2-1/8 inches deep (100 mm square by 60 mm deep).
- L. Gangable boxes are prohibited.
- M. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 1 Type 3R Type 4 Type 12 with continuous-hinge cover with flush latch unless otherwise indicated.
 - 1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
 - 2. Nonmetallic Enclosures: Plastic or Fiberglass.
 - 3. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.
- N. Cabinets:
 - 1. NEMA 250, galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
 - 2. Hinged door in front cover with flush latch and concealed hinge.
 - 3. Key latch to match panelboards.
 - 4. Metal barriers to separate wiring of different systems and voltage.
 - 5. Accessory feet where required for freestanding equipment.
 - 6. Nonmetallic cabinets shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

- A. Outdoors: Apply raceway products as specified below unless otherwise indicated:
 - 1. Exposed Conduit: Rigid galvanized steel conduit.
 - 2. Concealed Conduit, Aboveground: Aboveground: Rigid steel conduit.
 - 3. Underground Conduit RNC, Type EPC-40-PVC:
 - 4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
 - 5. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.

- B. Indoors: Apply raceway products as specified below unless otherwise indicated:
 - 1. Exposed, Not Subject to Physical Damage: EMT.
 - 2. Exposed, Not Subject to Severe Physical Damage: EMT.
 - 3. Exposed and Subject to Severe Physical Damage: Rigid Steel Conduit. Raceway locations include the following:
 - a. Loading dock.
 - b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
 - c. Mechanical rooms.
 - d. Gymnasiums.
 - 4. Concealed in Ceilings and Interior Walls and Partitions: EMT.
 - 5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
 - 6. Damp or Wet Locations: Rigid Steel Conduit.
 - 7. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4 stainless steel in institutional and commercial kitchens and damp or wet locations.

- C. Minimum Raceway Size: 3/4-inch (21-mm) trade size.

- D. Raceway Fittings: Compatible with raceways and suitable for use and location.
 - 1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
 - 2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with this type of conduit. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
 - 3. EMT: Use setscrew fittings. Comply with NEMA FB 2.10.
 - 4. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.

- E. Do not install aluminum boxes or fittings in contact with concrete or earth.

- F. Install surface raceways only where indicated on Drawings.

- G. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F (49 deg C).

3.2 INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.
- B. Keep raceways at least 6 inches (150 mm) away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- C. Complete raceway installation before starting conductor installation.
- D. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.
- E. Arrange stub-ups so curved portions of bends are not visible above finished slab.
- F. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches (300 mm) of changes in direction.
- G. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
- H. Support conduit within 12 inches (300 mm) of enclosures to which attached.
- I. Raceways Embedded in Slabs:
 - 1. Run conduit larger than 1-inch (27-mm) trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure raceways to reinforcement at maximum 10-foot (3-m) intervals.
 - 2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
 - 3. Arrange raceways to keep a minimum of 2 inches (50 mm) of concrete cover in all directions.
 - 4. Do not embed threadless fittings in concrete unless specifically approved by Architect for each specific location.
 - 5. Change from ENT to Rigid steel before rising above floor.
- J. Stub-ups to Above Recessed Ceilings:
 - 1. Use EMT, IMC, or RMC for raceways.
 - 2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.
- K. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
- L. Coat field-cut threads on PVC-coated raceway with a corrosion-preventing conductive compound prior to assembly.
- M. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.

- N. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch (35mm) trade size and insulated throat metal bushings on 1-1/2-inch (41-mm) trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.
- O. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.
- P. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.
- Q. Cut conduit perpendicular to the length. For conduits 2-inch (53-mm) trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.
- R. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb (90-kg) tensile strength. Leave at least 12 inches (300 mm) of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.
- S. Surface Raceways:
1. Install surface raceway with a minimum 2-inch (50-mm) radius control at bend points.
 2. Secure surface raceway with screws or other anchor-type devices at intervals not exceeding 48 inches (1200 mm) and with no less than two supports per straight raceway section. Support surface raceway according to manufacturer's written instructions. Tape and glue are not acceptable support methods.
- T. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings according to NFPA 70.
- U. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:
1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
 2. Where an underground service raceway enters a building or structure.
 3. Where otherwise required by NFPA 70.
- V. Comply with manufacturer's written instructions for solvent welding RNC and fittings.
- W. Expansion-Joint Fittings:
1. Install in each run of aboveground RNC that is located where environmental temperature change may exceed 30 deg F (17 deg C) and that has straight-run length that exceeds 25 feet (7.6 m). Install in each run of aboveground RMC and EMT conduit that is located where environmental temperature change may exceed 100 deg F (55 deg C) and that has straight-run length that exceeds 100 feet (30 m).
 2. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:
 - a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F (70 deg C) temperature change.

- b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F (86 deg C) temperature change.
 - c. Indoor Spaces Connected with Outdoors without Physical Separation: 125 deg F (70 deg C) temperature change.
 - d. Attics: 135 deg F (75 deg C) temperature change.
3. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F (0.06 mm per meter of length of straight run per deg C) of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F (0.0115 mm per meter of length of straight run per deg C) of temperature change for metal conduits.
 4. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
 5. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.
- X. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 72 inches (1830 mm) of flexible conduit for recessed and semi-recessed luminaires, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
1. Use LFMC in damp or wet locations subject to severe physical damage.
 2. Use LFMC in damp or wet locations not subject to severe physical damage.
- Y. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.
- Z. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box.
- AA. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.
- BB. Locate boxes so that cover or plate will not span different building finishes.
- CC. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.
- DD. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.
- EE. Set metal floor boxes level and flush with finished floor surface.
- FF. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

3.3 INSTALLATION OF UNDERGROUND CONDUIT

- A. Direct-Buried Conduit:

1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Section 312000 "Earth Moving" for pipe less than 6 inches (150 mm) in nominal diameter.
2. Install backfill as specified in Section 312000 "Earth Moving."
3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches (300 mm) of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Section 312000 "Earth Moving."
4. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through floor unless otherwise indicated. Encase elbows for stub-up ducts throughout length of elbow.
5. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through floor.
 - a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches (75 mm) of concrete for a minimum of 12 inches (300 mm) on each side of the coupling.
 - b. For stub-ups at equipment mounted on outdoor concrete bases and where conduits penetrate building foundations, extend steel conduit horizontally a minimum of 60 inches (1500 mm) from edge of foundation or equipment base. Install insulated grounding bushings on terminations at equipment.
6. Underground Warning Tape: Comply with requirements in Section 260553 "Identification for Electrical Systems."

3.4 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.5 FIRESTOPPING

- A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.6 PROTECTION

- A. Protect coatings, finishes, and cabinets from damage and deterioration.
 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 260533

SECTION 260543

UNDERGROUND DUCTS AND RACEWAYS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Direct-buried conduit, ducts, and duct accessories.
 - 2. Concrete-encased conduit, ducts, and duct accessories.
 - 3. Handholes and boxes.
 - 4. Manholes.

1.3 DEFINITIONS

- A. Trafficways: Locations where vehicular or pedestrian traffic is a normal course of events.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include duct-bank materials, including separators and miscellaneous components.
 - 2. Include ducts and conduits and their accessories, including elbows, end bells, bends, fittings, and solvent cement.
 - 3. Include accessories for manholes, handholes, boxes, and other utility structures.
 - 4. Include warning tape.
 - 5. Include warning planks.

1.5 MAINTENANCE MATERIALS SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1.6 FIELD CONDITIONS

- A. Interruption of Existing Electrical Service: Do not interrupt electrical service to facilities occupied by Owner or others unless permitted under the following conditions, and then only after arranging to provide temporary electrical service according to requirements indicated:

1. Notify Architect and Owner no fewer than seven days in advance of proposed interruption of electrical service.
 2. Do not proceed with interruption of electrical service without Owner's written permission.
- B. Ground Water: Assume ground-water level is at grade level unless a lower water table is noted on Drawings.
- C. Ground Water: Assume ground-water level is 36 inches (900 mm) below ground surface unless a higher water table is noted on Drawings.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR DUCTS AND RACEWAYS

- A. Comply with ANSI C2.

2.2 CONDUIT

- A. Rigid Steel Conduit: Galvanized. Comply with ANSI C80.1.
- B. RNC: NEMA TC 2, Type EPC-40-PVC and Type EPC-80-PVC, UL 651, with matching fittings by same manufacturer as the conduit, complying with NEMA TC 3 and UL 514B.

2.3 NONMETALLIC DUCTS AND DUCT ACCESSORIES

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or a comparable product by one of the following:
1. ARNCO Corp.
 2. Beck Manufacturing.
 3. Cantex, Inc.
 4. CertainTeed Corporation.
 5. Condux International, Inc.
 6. Electri-Flex Company.
 7. IPEX Inc.
 8. Lamson & Sessions; Carlon Electrical Products.
 9. Spiraduct/AFC Cable Systems, Inc.
- B. Underground Plastic Utilities Duct: NEMA TC 2, UL 651, ASTM F 512, Type EPC-80 and Type EPC-40, with matching fittings complying with NEMA TC 3 by same manufacturer as the duct.
- C. Underground Plastic Utilities Duct: NEMA TC 6 & 8, ASTM F 512, UL 651A, Type HDPE and Type EB-20-PVC, with matching fittings complying with NEMA TC 9 by same manufacturer as the duct.
- D. Underground Plastic Utilities Duct: NEMA TC 6 & 8, ASTM F 512, Type DB-60-PVC and Type DB-120-PVC, for direct burial, with matching fittings complying with NEMA TC 9 by same manufacturer as the duct.
- E. Duct Accessories:

1. Duct Separators: Factory-fabricated rigid PVC interlocking spacers, sized for type and size of ducts with which used, and selected to provide minimum duct spacing indicated while supporting ducts during concreting or backfilling.
2. Warning Tape: Underground-line warning tape specified in Section 260553 "Identification for Electrical Systems."

PART 3 - EXECUTION

3.1 PREPARATION

- A. Coordinate layout and installation of ducts, manholes, handholes, and boxes with final arrangement of other utilities, site grading, and surface features as determined in the field. Notify Architect if there is a conflict between areas of excavation and existing structures or archaeological sites to remain.
- B. Coordinate elevations of ducts and duct-bank entrances into manholes, handholes, and boxes with final locations and profiles of ducts and duct banks, as determined by coordination with other utilities, underground obstructions, and surface features. Revise locations and elevations as required to suit field conditions and to ensure that duct runs drain to manholes and handholes, and as approved by Architect.
- C. Clear and grub vegetation to be removed, and protect vegetation to remain according to Section 311000 "Site Clearing." Remove and stockpile topsoil for reapplication according to Section 311000 "Site Clearing."

3.2 EARTHWORK

- A. Excavation and Backfill: Comply with Section 312000 "Earth Moving," but do not use heavy-duty, hydraulic-operated, compaction equipment.
- B. Restore surface features at areas disturbed by excavation, and re-establish original grades unless otherwise indicated. Replace removed sod immediately after backfilling is completed.
- C. Restore areas disturbed by trenching, storing of dirt, cable laying, and other work. Restore vegetation and include necessary topsoiling, fertilizing, liming, seeding, sodding, sprigging, and mulching. Comply with Section 329200 "Turf and Grasses" and Section 329300 "Plants."
- D. Cut and patch existing pavement in the path of underground ducts and utility structures according to the "Cutting and Patching" Article in Section 017300 "Execution."

3.3 DUCT INSTALLATION

- A. Install ducts according to NEMA TCB 2.
- B. Slope: Pitch ducts a minimum slope of 1:300 down toward manholes and handholes and away from buildings and equipment. Slope ducts from a high point in runs between two manholes, to drain in both directions.
- C. Curves and Bends: Use 5-degree angle couplings for small changes in direction. Use manufactured long sweep bends with a minimum radius of 48 inches (1200 mm) both horizontally and vertically, at other locations unless otherwise indicated.

- D. Joints: Use solvent-cemented joints in ducts and fittings and make watertight according to manufacturer's written instructions. Stagger couplings so those of adjacent ducts do not lie in same plane.
- E. Installation Adjacent to High-Temperature Steam Lines: Where duct banks are installed parallel to underground steam lines, perform calculations showing the duct bank will not be subject to environmental temperatures above 40 deg C. Where environmental temperatures are calculated to rise above 40 deg C, and anywhere the duct bank crosses above an underground steam line, install insulation blankets listed for direct burial to isolate the duct bank from the steam line.
- F. Building Wall Penetrations: Make a transition from underground duct to rigid steel conduit at least 10 feet (3 m) outside the building wall, without reducing duct line slope away from the building, and without forming a trap in the line. Use fittings manufactured for duct-to-conduit transition. Install conduit penetrations of building walls as specified in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."
- G. Sealing: Provide temporary closure at terminations of ducts that have cables pulled. Seal spare ducts at terminations. Use sealing compound and plugs to withstand at least 15-psig (1.03-MPa) hydrostatic pressure.
- H. Pulling Cord: Install 100-lbf- (445-N-) test nylon cord in empty ducts.
- I. Direct-Buried Duct Banks:
 - 1. Excavate trench bottom to provide firm and uniform support for duct bank. Comply with requirements in Section 312000 "Earth Moving" for preparation of trench bottoms for pipes less than 6 inches (150 mm) in nominal diameter.
 - 2. Support ducts on duct separators coordinated with duct size, duct spacing, and outdoor temperature.
 - 3. Space separators close enough to prevent sagging and deforming of ducts, with not less than four spacers per 20 feet (6 m) of duct. Secure separators to earth and to ducts to prevent displacement during backfill and yet permit linear duct movement due to expansion and contraction as temperature changes. Stagger spacers approximately 6 inches (150 mm) between tiers.
 - 4. Depth: Install top of duct bank at least 36 inches (900 mm) below finished grade unless otherwise indicated.
 - 5. Set elevation of bottom of duct bank below frost line.
 - 6. Install ducts with a minimum of 3 inches (75 mm) between ducts for like services and 6 inches (150 mm) between power and signal ducts.
 - 7. Elbows: Install manufactured duct elbows for stub-ups at poles and equipment, at building entrances through floor, and at changes of direction in duct run unless otherwise indicated. Encase elbows for stub-up ducts throughout length of elbow.
 - 8. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment, at building entrances through floor, and at changes of direction in duct run.
 - a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches (75 mm) of concrete.
 - b. For equipment mounted on outdoor concrete bases, extend steel conduit horizontally a minimum of 60 inches (1500 mm) from edge of equipment pad or foundation. Install insulated grounding bushings on terminations at equipment.
 - 9. After installing first tier of ducts, backfill and compact. Start at tie-in point and work toward end of duct run, leaving ducts at end of run free to move with expansion and contraction as temperature changes during this process. Repeat procedure after placing each tier. After placing last tier, hand place backfill to 4 inches (100 mm) over ducts and

hand tamp. Firmly tamp backfill around ducts to provide maximum supporting strength. Use hand tamper only. After placing controlled backfill over final tier, make final duct connections at end of run and complete backfilling with normal compaction. Comply with requirements in Section 312000 "Earth Moving" for installation of backfill materials.

- a. Place minimum 3 inches (75 mm) of sand as a bed for duct bank. Place sand to a minimum of 6 inches (150 mm) above top level of duct bank.
 - b. Place minimum 6 inches (150 mm) of engineered fill above concrete encasement of duct bank.
- J. Warning Tape: Bury warning tape approximately 12 inches (300 mm) above all concrete-encased ducts and duct banks. Align tape parallel to and within 3 inches (75 mm) of centerline of duct bank. Provide an additional warning tape for each 12-inch (300-mm) increment of duct-bank width over a nominal 18 inches (450 mm). Space additional tapes 12 inches (300 mm) apart, horizontally.

3.4 GROUNDING

- A. Ground underground ducts and utility structures according to Section 260526 "Grounding and Bonding for Electrical Systems."

3.5 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections and prepare test reports:
 1. Demonstrate capability and compliance with requirements on completion of installation of underground ducts and utility structures.
 2. Pull solid aluminum or wood test mandrel through duct to prove joint integrity and adequate bend radii, and test for out-of-round duct. Provide a minimum 6-inch- (150-mm-) long mandrel equal to 80 percent fill of duct. If obstructions are indicated, remove obstructions and retest.
 3. Test manhole and handhole grounding to ensure electrical continuity of grounding and bonding connections. Measure and report ground resistance as specified in Section 260526 "Grounding and Bonding for Electrical Systems."
- B. Correct deficiencies and retest as specified above to demonstrate compliance.

3.6 CLEANING

- A. Pull leather-washer-type duct cleaner, with graduated washer sizes, through full length of ducts. Follow with rubber duct swab for final cleaning and to assist in spreading lubricant throughout ducts.
- B. Clean internal surfaces of manholes, including sump. Remove foreign material.

END OF SECTION 260543

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SECTION 260544

SLEEVES AND SLEEVE SEALS FOR ELECTRICAL RACEWAYS AND CABLING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Sleeves for raceway and cable penetration of non-fire-rated construction walls and floors.
 - 2. Sleeve-seal systems.
 - 3. Sleeve-seal fittings.
 - 4. Grout.
 - 5. Silicone sealants.
- B. Related Requirements:
 - 1. Section 078413 "Penetration Firestopping" for penetration firestopping installed in fire-resistance-rated walls, horizontal assemblies, and smoke barriers, with and without penetrating items.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 SLEEVES

- A. Wall Sleeves:
 - 1. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, plain ends.
 - 2. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.
- B. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies: Galvanized-steel sheet; 0.0239-inch (0.6-mm) minimum thickness; round tube closed with welded longitudinal joint, with tabs for screw-fastening the sleeve to the board.
- C. PVC-Pipe Sleeves: ASTM D 1785, Schedule 40.

- D. Molded-PVC Sleeves: With nailing flange for attaching to wooden forms.
- E. Molded-PE or -PP Sleeves: Removable, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.
- F. Sleeves for Rectangular Openings:
 - 1. Material: Galvanized sheet steel.
 - 2. Minimum Metal Thickness:
 - a. For sleeve cross-section rectangle perimeter less than 50 inches (1270 mm) and with no side larger than 16 inches (400 mm), thickness shall be 0.052 inch (1.3 mm).
 - b. For sleeve cross-section rectangle perimeter 50 inches (1270 mm) or more and one or more sides larger than 16 inches (400 mm), thickness shall be 0.138 inch (3.5 mm).

2.2 SLEEVE-SEAL SYSTEMS

- A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Advance Products & Systems, Inc.
 - b. CALPICO, Inc.
 - c. Metraflex Company (The).
 - d. Pipeline Seal and Insulator, Inc.
 - e. Proco Products, Inc.
 - 2. Sealing Elements: EPDM rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
 - 3. Pressure Plates: Carbon steel.
 - 4. Connecting Bolts and Nuts: Carbon steel, with corrosion-resistant coating, Stainless steel of length required to secure pressure plates to sealing elements.

2.3 SLEEVE-SEAL FITTINGS

- A. Description: Manufactured plastic, sleeve-type, waterstop assembly made for embedding in concrete slab or wall. Unit shall have plastic or rubber waterstop collar with center opening to match piping OD.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Presealed Systems.
 - b. Pre-approved equal.

2.4 GROUT

- A. Description: Nonshrink; recommended for interior and exterior sealing openings in non-fire-rated walls or floors.
- B. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
- C. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.
- D. Packaging: Premixed and factory packaged.

2.5 SILICONE SEALANTS

- A. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below.
 - 1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces that are not fire rated.
 - 2. Sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- B. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION FOR NON-FIRE-RATED ELECTRICAL PENETRATIONS

- A. Comply with NECA 1.
- B. Comply with NEMA VE 2 for cable tray and cable penetrations.
- C. Sleeves for Conduits Penetrating Above-Grade Non-Fire-Rated Concrete and Masonry-Unit Floors and Walls:
 - 1. Interior Penetrations of Non-Fire-Rated Walls and Floors:
 - a. Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Section 079200 "Joint Sealants."
 - b. Seal space outside of sleeves with mortar or grout. Pack sealing material solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect material while curing.
 - 2. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
 - 3. Size pipe sleeves to provide 1/4-inch (6.4-mm) annular clear space between sleeve and raceway or cable unless sleeve seal is to be installed.
 - 4. Install sleeves for wall penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of walls. Cut sleeves to length for mounting flush with both surfaces of walls. Deburr after cutting.

5. Install sleeves for floor penetrations. Extend sleeves installed in floors 2 inches (50 mm) above finished floor level. Install sleeves during erection of floors.
- D. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies:
1. Use circular metal sleeves unless penetration arrangement requires rectangular sleeved opening.
 2. Seal space outside of sleeves with approved joint compound for gypsum board assemblies.
- E. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.
- F. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- G. Underground, Exterior-Wall and Floor Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch (25-mm) annular clear space between raceway or cable and sleeve for installing sleeve-seal system.

3.2 SLEEVE-SEAL-SYSTEM INSTALLATION

- A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at raceway entries into building.
- B. Install type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.3 SLEEVE-SEAL-FITTING INSTALLATION

- A. Install sleeve-seal fittings in new walls and slabs as they are constructed.
- B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.
- C. Secure nailing flanges to concrete forms.
- D. Using grout, seal the space around outside of sleeve-seal fittings.

END OF SECTION 260544

SECTION 260548

VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Isolation pads.
 - 2. Spring isolators.
 - 3. Restrained spring isolators.
 - 4. Channel support systems.
 - 5. Restraint cables.
 - 6. Hanger rod stiffeners.
 - 7. Anchorage bushings and washers.
- B. Related Sections include the following:
 - 1. Section 260529 "Hangers and Supports for Electrical Systems" for commonly used electrical supports and installation requirements.

1.3 DEFINITIONS

- A. The IBC: International Building Code.
- B. ICC-ES: ICC-Evaluation Service.
- C. OSHPD: Office of Statewide Health Planning and Development for the State of California.

1.4 PERFORMANCE REQUIREMENTS

- A. Seismic-Restraint Loading: Refer to project Structural Drawings and Specifications for the following, as defined in the IBC:
 - 1. Site Class: As indicated in structural project documents.
 - 2. Assigned seismic use group or building category.
 - a. Component Response Modification Factor: As indicated in structural project documents.
 - b. Component Amplification Factor: as indicated in structural project documents.
 - 3. Design Spectral Response Acceleration at Short Periods (0.2 Second): As indicated in structural project documents
 - 4. Design Spectral Response Acceleration at 1.0-Second Period: As indicated in structural project documents.

- B. In order to identify systems requiring seismic restraint and to define those from which restraints may be excluded, utility components are assigned an ASCE 7 importance Factor (I_p) on the basis of the following:
- a. $I_p=1.5$
 - 1) Essential facilities required for post earthquake recovery = all components required for the continued operation of the facility.
 - 2) Life-safety components which are required to function after a seismic event including all equipment feeding and connected to the life safety branch of the electrical system.
 - 3) All equipment feeding and connected to the stand-by branch of the electrical system.
 - b. $I_p= 1.0$ all other componets.

1.5 ACTION SUBMITTALS

- A. Product Data: For the following:
1. Include rated load, rated deflection, and overload capacity for each vibration isolation device.
 2. Illustrate and indicate style, material, strength, fastening provision, and finish for each type and size of seismic-restraint component used.
 - a. Tabulate types and sizes of seismic restraints, complete with report numbers and rated strength in tension and shear as evaluated by an agency acceptable to authorities having jurisdiction.
 - b. Annotate to indicate application of each product submitted and compliance with requirements.
 3. Restrained-Isolation Devices: Include ratings for horizontal, vertical, and combined loads.
- B. Delegated-Design Submittal: For vibration isolation and seismic-restraint details indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
1. Design Calculations: Calculate static and dynamic loading due to equipment weight and operation, seismic forces required to select vibration isolators and seismic restraints.
 - a. Coordinate design calculations with wind-load calculations required for equipment mounted outdoors. Comply with requirements in other electrical Sections for equipment mounted outdoors.
 2. Indicate materials and dimensions and identify hardware, including attachment and anchorage devices.
 3. Field-fabricated supports.
 4. Seismic-Restraint Details:
 - a. Design Analysis: To support selection and arrangement of seismic restraints. Include calculations of combined tensile and shear loads.
 - b. Details: Indicate fabrication and arrangement. Detail attachments of restraints to the restrained items and to the structure. Show attachment locations, methods, and spacings. Identify components, list their strengths, and indicate directions and values of forces transmitted to the structure during seismic events. Indicate association with vibration isolation devices.

- c. Preapproval and Evaluation Documentation: By an agency acceptable to authorities having jurisdiction, showing maximum ratings of restraint items and the basis for approval (tests or calculations).

1.6 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Show coordination of seismic bracing for electrical components with other systems and equipment in the vicinity, including other supports and seismic restraints.
- B. Qualification Data: For professional engineer.
- C. Welding certificates.
- D. Field quality-control test reports.

1.7 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.
- B. Comply with seismic-restraint requirements in the IBC unless requirements in this Section are more stringent.
- C. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- D. Seismic-restraint devices shall have horizontal and vertical load testing and analysis and shall bear anchorage preapproval OPA number from OSHPD, preapproval by ICC-ES, or preapproval by another agency acceptable to authorities having jurisdiction, showing maximum seismic-restraint ratings. Ratings based on independent testing are preferred to ratings based on calculations. If preapproved ratings are not available, submittals based on independent testing are preferred. Calculations (including combining shear and tensile loads) to support seismic-restraint designs must be signed and sealed by a qualified professional engineer.
- E. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 VIBRATION ISOLATORS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 - 1. Ace Mountings Co., Inc.
 - 2. Amber/Booth Company, Inc.
 - 3. California Dynamics Corporation.
 - 4. Isolation Technology, Inc.
 - 5. Kinetics Noise Control.
 - 6. Mason Industries.
 - 7. Vibration Eliminator Co., Inc.

8. Vibration Isolation.
 9. Vibration Mountings & Controls, Inc.
- B. Pads : Arrange in single or multiple layers of sufficient stiffness for uniform loading over pad area, molded with a nonslip pattern and galvanized-steel baseplates, and factory cut to sizes that match requirements of supported equipment.
1. Resilient Material: Oil- and water-resistant neoprene.
- C. Spring Isolators : Freestanding, laterally stable, open-spring isolators.
1. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
 2. Minimum Additional Travel: 50 percent of the required deflection at rated load.
 3. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
 4. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
 5. Baseplates: Factory drilled for bolting to structure and bonded to 1/4-inch- (6-mm-) thick, rubber isolator pad attached to baseplate underside. Baseplates shall limit floor load to 500 psig (3447 kPa).
 6. Top Plate and Adjustment Bolt: Threaded top plate with adjustment bolt and cap screw to fasten and level equipment.
- D. Restrained Spring Isolators Freestanding, steel, open-spring isolators with seismic or limit-stop restraint.
1. Housing: Steel with resilient vertical-limit stops to prevent spring extension due to weight being removed; factory-drilled baseplate bonded to 1/4-inch- (6-mm-) thick, neoprene or rubber isolator pad attached to baseplate underside; and adjustable equipment mounting and leveling bolt that acts as blocking during installation.
 2. Restraint: Seismic or limit-stop as required for equipment and authorities having jurisdiction.
 3. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
 4. Minimum Additional Travel: 50 percent of the required deflection at rated load.
 5. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
 6. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.

2.2 SEISMIC-RESTRAINT DEVICES

- A. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
1. Amber/Booth Company, Inc.
 2. California Dynamics Corporation.
 3. Cooper B-Line, Inc.; a division of Cooper Industries.
 4. Hilti Inc.
 5. Loos & Co.; Seismic Earthquake Division.
 6. Mason Industries.
 7. TOLCO Incorporated; a brand of NIBCO INC.
 8. Unistrut; Tyco International, Ltd.

- B. General Requirements for Restraint Components: Rated strengths, features, and application requirements shall be as defined in reports by an agency acceptable to authorities having jurisdiction.
 - 1. Structural Safety Factor: Allowable strength in tension, shear, and pullout force of components shall be at least four times the maximum seismic forces to which they will be subjected.
- C. Channel Support System: MFMA-3, shop- or field-fabricated support assembly made of slotted steel channels with accessories for attachment to braced component at one end and to building structure at the other end and other matching components and with corrosion-resistant coating; and rated in tension, compression, and torsion forces.
- D. Restraint Cables: ASTM A 603 galvanized -steel cables with end connections made of steel assemblies with thimbles, brackets, swivels, and bolts designed for restraining cable service; and with a minimum of two clamping bolts for cable engagement.
- E. Hanger Rod Stiffener: Reinforcing steel angle clamped to hanger rod. Do not weld stiffeners to rods.
- F. Bushings for Floor-Mounted Equipment Anchor: Neoprene bushings designed for rigid equipment mountings, and matched to type and size of anchors and studs.
- G. Bushing Assemblies for Wall-Mounted Equipment Anchorage: Assemblies of neoprene elements and steel sleeves designed for rigid equipment mountings, and matched to type and size of attachment devices.
- H. Resilient Isolation Washers and Bushings: One-piece, molded, oil- and water-resistant neoprene, with a flat washer face.
- I. Mechanical Anchor: Drilled-in and stud-wedge or female-wedge type in zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchors with strength required for anchor and as tested according to ASTM E 488. Minimum length of eight times diameter.
- J. Adhesive Anchor: Drilled-in and capsule anchor system containing polyvinyl or urethane methacrylate-based resin and accelerator, or injected polymer or hybrid mortar adhesive. Provide anchor bolts and hardware with zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488.

2.3 FACTORY FINISHES

- A. Finish: Manufacturer's standard prime-coat finish ready for field painting.
- B. Finish: Manufacturer's standard paint applied to factory-assembled and -tested equipment before shipping.
 - 1. Powder coating on springs and housings.
 - 2. All hardware shall be galvanized. Hot-dip galvanize metal components for exterior use.
 - 3. Baked enamel or powder coat for metal components on isolators for interior use.
 - 4. Color-code or otherwise mark vibration isolation and seismic-control devices to indicate capacity range.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and equipment to receive vibration isolation and seismic-control devices for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Examine roughing-in of reinforcement and cast-in-place anchors to verify actual locations before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLICATIONS

- A. Multiple Raceways or Cables: Secure raceways and cables to trapeze member with clamps approved for application an agency acceptable to authorities having jurisdiction.
- B. Hanger Rod Stiffeners: Install hanger rod stiffeners where indicated or scheduled on Drawings to receive them and where required to prevent buckling of hanger rods due to seismic forces.
- C. Strength of Support and Seismic-Restraint Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static and seismic loads within specified loading limits.

3.3 SEISMIC-RESTRAINT DEVICE INSTALLATION

- A. Equipment and Hanger Restraints:
 - 1. Install restrained isolators on electrical equipment.
 - 2. Install resilient, bolt-isolation washers on equipment anchor bolts where clearance between anchor and adjacent surface exceeds 0.125 inch (3.2 mm).
 - 3. Install seismic-restraint devices using methods approved by an agency acceptable to authorities having jurisdiction providing required submittals for component.
- B. Install bushing assemblies for mounting bolts for wall-mounted equipment, arranged to provide resilient media where equipment or equipment-mounting channels are attached to wall.
- C. Attachment to Structure: If specific attachment is not indicated, anchor bracing to structure at flanges of beams, at upper truss chords of bar joists, or at concrete members.
- D. Drilled-in Anchors:
 - 1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcing or embedded items during coring or drilling. Notify the structural engineer if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.
 - 2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.

3. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
4. Adhesive Anchors: Clean holes to remove loose material and drilling dust prior to installation of adhesive. Place adhesive in holes proceeding from the bottom of the hole and progressing toward the surface in such a manner as to avoid introduction of air pockets in the adhesive.
5. Set anchors to manufacturer's recommended torque, using a torque wrench.
6. Install zinc-coated steel anchors for interior and stainless-steel anchors for exterior applications.

3.4 ACCOMMODATION OF DIFFERENTIAL SEISMIC MOTION

- A. Install flexible connections in runs of raceways, cables, wireways, cable trays, and busways where they cross seismic joints, where adjacent sections or branches are supported by different structural elements, and where they terminate with connection to equipment that is anchored to a different structural element from the one supporting them as they approach equipment.

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections and prepare test reports.
- B. Perform tests and inspections.
- C. Tests and Inspections:
 1. Provide evidence of recent calibration of test equipment by a testing agency acceptable to authorities having jurisdiction.
 2. Schedule test with Owner, through Architect, before connecting anchorage device to restrained component (unless postconnection testing has been approved), and with at least seven days' advance notice.
 3. Obtain Architect's approval before transmitting test loads to structure. Provide temporary load-spreading members.
 4. Test at least four of each type and size of installed anchors and fasteners selected by Architect.
 5. Test to 90 percent of rated proof load of device.
 6. Measure isolator restraint clearance.
 7. Measure isolator deflection.
 8. Verify snubber minimum clearances.
 9. If a device fails test, modify all installations of same type and retest until satisfactory results are achieved.
- D. Remove and replace malfunctioning units and retest as specified above.
- E. Prepare test and inspection reports.

3.6 ADJUSTING

- A. Adjust isolators after isolated equipment is at operating weight.

- B. Adjust limit stops on restrained spring isolators to mount equipment at normal operating height. After equipment installation is complete, adjust limit stops so they are out of contact during normal operation.
- C. Adjust active height of spring isolators.
- D. Adjust restraints to permit free movement of equipment within normal mode of operation.

END OF SECTION 260548

SECTION 260553

IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Identification for raceways.
 - 2. Identification of power and control cables.
 - 3. Identification for conductors.
 - 4. Underground-line warning tape.
 - 5. Warning labels and signs.
 - 6. Instruction signs.
 - 7. Equipment identification labels.
 - 8. Miscellaneous identification products.

1.3 ACTION SUBMITTALS

- A. Product Data: For each electrical identification product indicated.
- B. Samples: For each type of label and sign to illustrate size, colors, lettering style, mounting provisions, and graphic features of identification products.
- C. Identification Schedule: An index of nomenclature of electrical equipment and system components used in identification signs and labels.

1.4 QUALITY ASSURANCE

- A. Comply with ANSI A13.1.
- B. Comply with NFPA 70.
- C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.
- D. Comply with ANSI Z535.4 for safety signs and labels.
- E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

1.5 COORDINATION

- A. Coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual; and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.
- B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- C. Coordinate installation of identifying devices with location of access panels and doors.
- D. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 POWER AND CONTROL RACEWAY IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway size.
- B. Colors for Raceways Carrying Circuits at 600 V or Less:
 - 1. Black letters on an orange field.
 - 2. Legend: Indicate voltage.
- C. Colors for Raceways Carrying Circuits at More Than 600 V:
 - 1. Black letters on an orange field.
 - 2. Legend: "DANGER CONCEALED HIGH VOLTAGE WIRING."
- D. Vinyl Labels for Raceways Carrying Circuits at 600 V or Less: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing ends of legend label.
- E. Snap-Around Labels for Raceways Carrying Circuits at 600 V or Less: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
- F. Snap-Around, Color-Coding Bands for Raceways Carrying Circuits at 600 V or Less: Slit, pretensioned, flexible, solid-colored acrylic sleeve, **2 inches (50 mm)** long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
- G. Tape and Stencil for Raceways Carrying Circuits More Than 600 V: **4-inch- (100-mm-)** wide black stripes on **10-inch (250-mm)** centers diagonally over orange background that extends full length of raceway or duct and is **12 inches (300 mm)** wide. Stop stripes at legends.
- H. Metal Tags: Brass or aluminum, **2 by 2 by 0.05 inch (50 by 50 by 1.3 mm)**, with stamped legend, punched for use with self-locking cable tie fastener.
- I. Write-On Tags: Polyester tag, **0.015 inch (0.38 mm)** thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.

1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
2. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

2.2 ARMORED AND METAL-CLAD CABLE IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each cable size.
- B. Colors for Cables Carrying Circuits at 600 V and Less:
 1. **Black letters on an orange field**
 2. Legend: Indicate voltage and system or service type.
- C. Colors for Cables Carrying Circuits at More Than 600 V:
 1. Black letters on an orange field.
 2. Legend: "DANGER HIGH VOLTAGE WIRING."
- D. Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing ends of legend label.
- E. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; **2 inches (50 mm)** wide; compounded for outdoor use.
- F. Heat-Shrink Preprinted Tubes: Flame-retardant polyolefin tube with machine-printed identification label. Sized to suit diameter of and shrinks to fit firmly around cable it identifies. Full shrink recovery at a maximum of **200 deg F (93 deg C)**. Comply with UL 224.

2.3 POWER AND CONTROL CABLE IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each cable size.
- B. Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing ends of legend label.
- C. Self-Adhesive, Self-Laminating Polyester Labels: Preprinted, **3-mil- (0.08-mm-)** thick flexible label with acrylic pressure-sensitive adhesive that provides a clear, weather- and chemical-resistant, self-laminating, protective shield over the legend. Labels sized to fit the cable diameter such that the clear shield overlaps the entire printed legend.
- D. Heat-Shrink Preprinted Tubes: Flame-retardant polyolefin tube with machine-printed identification label. Sized to suit diameter of and shrinks to fit firmly around cable it identifies. Full shrink recovery at a maximum of **200 deg F (93 deg C)**. Comply with UL 224.
- E. Metal Tags: Brass or aluminum, **2 by 2 by 0.05 inch (50 by 50 by 1.3 mm)**, with stamped legend, punched for use with self-locking cable tie fastener.
- F. Write-On Tags: Polyester tag, **0.015 inch (0.38 mm)** thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.

1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
 2. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.
- G. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of cable it identifies and to stay in place by gripping action.
- H. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeve, **2 inches (50 mm)** long, with diameter sized to suit diameter of cable it identifies and to stay in place by gripping action.

2.4 CONDUCTOR IDENTIFICATION MATERIALS

- A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than **3 mils (0.08 mm)** thick by **1 to 2 inches (25 to 50 mm)** wide.
- B. Self-Adhesive, Self-Laminating Polyester Labels: Preprinted, **3-mil- (0.08-mm-)** thick flexible label with acrylic pressure-sensitive adhesive that provides a clear, weather- and chemical-resistant, self-laminating, protective shield over the legend. Labels sized to fit the conductor diameter such that the clear shield overlaps the entire printed legend.
- C. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of conductor it identifies and to stay in place by gripping action.
- D. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeve with diameter sized to suit diameter of conductor it identifies and to stay in place by gripping action.
- E. Heat-Shrink Preprinted Tubes: Flame-retardant polyolefin tube with machine-printed identification label. Sized to suit diameter of and shrinks to fit firmly around conductor it identifies. Full shrink recovery at a maximum of **200 deg F (93 deg C)**. Comply with UL 224.
- F. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.
- G. Write-On Tags: Polyester tag, **0.015 inch (0.38 mm)** thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.
1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
 2. Labels for Tags: Self-adhesive label, machine-printed with permanent, waterproof, black ink recommended by printer manufacturer, sized for attachment to tag.

2.5 FLOOR MARKING TAPE

- A. **2-inch- (50-mm-)** wide, **5-mil (0.125-mm)** pressure-sensitive vinyl tape, with black and white stripes and clear vinyl overlay.

2.6 WARNING LABELS AND SIGNS

- A. Comply with NFPA 70 and 29 CFR 1910.145.

- B. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.
- C. Baked-Enamel Warning Signs:
 - 1. Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application.
 - 2. 1/4-inch (6.4-mm) grommets in corners for mounting.
 - 3. Nominal size, 7 by 10 inches (180 by 250 mm).
- D. Metal-Backed, Butyrate Warning Signs:
 - 1. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch (1-mm) galvanized-steel backing; and with colors, legend, and size required for application.
 - 2. 1/4-inch (6.4-mm) grommets in corners for mounting.
 - 3. Nominal size, 10 by 14 inches (250 by 360 mm).
- E. Warning label and sign shall include, but are not limited to, the following legends:
 - 1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
 - 2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES (915 MM)."

2.7 INSTRUCTION SIGNS

- A. Engraved, laminated acrylic or melamine plastic, minimum 1/16 inch (1.6 mm) thick for signs up to 20 sq. inches (129 sq. cm) and 1/8 inch (3.2 mm) thick for larger sizes.
 - 1. Engraved legend with black letters on white face.
 - 2. Punched or drilled for mechanical fasteners.
 - 3. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.
- B. Adhesive Film Label: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch (10 mm).
- C. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch (10 mm). Overlay shall provide a weatherproof and UV-resistant seal for label.

2.8 EQUIPMENT IDENTIFICATION LABELS

- A. Adhesive Film Label: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch (10 mm).
- B. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch (10 mm). Overlay shall provide a weatherproof and UV-resistant seal for label.

- C. Self-Adhesive, Engraved, Laminated Acrylic or Melamine Label: Adhesive backed, with white letters on a dark-gray background. Minimum letter height shall be **3/8 inch (10 mm)**.
- D. Engraved, Laminated Acrylic or Melamine Label: Punched or drilled for screw mounting. White letters on a dark-gray background. Minimum letter height shall be **3/8 inch (10 mm)**.
- E. Stenciled Legend: In nonfading, waterproof, black ink or paint. Minimum letter height shall be **1 inch (25 mm)**

2.9 CABLE TIES

- A. General-Purpose Cable Ties: Fungus inert, self extinguishing, one piece, self locking, Type 6/6 nylon.
 1. Minimum Width: **3/16 inch (5 mm)**.
 2. Tensile Strength at **73 deg F (23 deg C)**, According to ASTM D 638: **12,000 psi (82.7 MPa)**.
 3. Temperature Range: **Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C)**.
 4. Color: Black except where used for color-coding.
- B. UV-Stabilized Cable Ties: Fungus inert, designed for continuous exposure to exterior sunlight, self extinguishing, one piece, self locking, Type 6/6 nylon.
 1. Minimum Width: **3/16 inch (5 mm)**.
 2. Tensile Strength at **73 deg F (23 deg C)**, According to ASTM D 638: **12,000 psi (82.7 MPa)**.
 3. Temperature Range: **Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C)**.
 4. Color: Black.
- C. Plenum-Rated Cable Ties: Self extinguishing, UV stabilized, one piece, self locking.
 1. Minimum Width: **3/16 inch (5 mm)**.
 2. Tensile Strength at **73 deg F (23 deg C)**, According to ASTM D 638: **7000 psi (48.2 MPa)**.
 3. UL 94 Flame Rating: 94V-0.
 4. Temperature Range: **Minus 50 to plus 284 deg F (Minus 46 to plus 140 deg C)**.
 5. Color: Black.

2.10 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Select paint system applicable for surface material and location (exterior or interior).
- B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Verify identity of each item before installing identification products.
- B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.
- C. Apply identification devices to surfaces that require finish after completing finish work.
- D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.
- E. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
- F. Attach plastic raceway and cable labels that are not self-adhesive type with clear vinyl tape with adhesive appropriate to the location and substrate.
- G. System Identification Color-Coding Bands for Raceways and Cables: Each color-coding band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at **50-foot (15-m)** maximum intervals in straight runs, and at **25-foot (7.6-m)** maximum intervals in congested areas.
- H. Aluminum Wraparound Marker Labels and Metal Tags: Secure tight to surface of conductor or cable at a location with high visibility and accessibility.
- I. Cable Ties: For attaching tags. Use general-purpose type, except as listed below:
 - 1. Outdoors: UV-stabilized nylon.
 - 2. In Spaces Handling Environmental Air: Plenum rated.
- J. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at **6 to 8 inches (150 to 200 mm)** below finished grade. Use multiple tapes where width of multiple lines installed in a common trench exceeds **16 inches (400 mm)** overall.
- K. Painted Identification: Comply with requirements in painting Sections for surface preparation and paint application.

3.2 IDENTIFICATION SCHEDULE

- A. Concealed Raceways, Duct Banks, More Than 600 V, within Buildings: Tape and stencil **4-inch- (100-mm-)** wide black stripes on **10-inch (250-mm)** centers over orange background that extends full length of raceway or duct and is **12 inches (300 mm)** wide. Stencil legend "DANGER CONCEALED HIGH VOLTAGE WIRING" with **3-inch- (75-mm-)** high black letters on **20-inch (500-mm)** centers. Stop stripes at legends. Apply to the following finished surfaces:
 - 1. Floor surface directly above conduits running beneath and within **12 inches (300 mm)** of a floor that is in contact with earth or is framed above unexcavated space.
 - 2. Wall surfaces directly external to raceways concealed within wall.

3. Accessible surfaces of concrete envelope around raceways in vertical shafts, exposed in the building, or concealed above suspended ceilings.
- B. Accessible Raceways, Armored and Metal-Clad Cables, More Than 600 V: Snap-around labels. Install labels at [10-foot (3-m)] [30-foot (10-m)] maximum intervals.
- C. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits More Than 30A, and 120V to ground: Identify with self-adhesive vinyl label. Install labels at [10-foot (3-m)] [30-foot (10-m)] maximum intervals.
- D. Accessible Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive vinyl labels with the wiring system legend and system voltage. System legends shall be as follows:
 1. Emergency Power.
 2. Power.
 3. UPS.
- E. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use color-coding conductor tape to identify the phase.
 1. Color-Coding for Phase and Voltage Level Identification, 600 V or Less: Use colors listed below for ungrounded feeder and branch-circuit conductors.
 - a. Color shall be factory applied or field applied for sizes larger than No. 8 AWG, if authorities having jurisdiction permit.
 - b. Colors for 208/120-V Circuits:
 - 1) Phase A: Black.
 - 2) Phase B: Red.
 - 3) Phase C: Blue.
 - c. Colors for 480/277-V Circuits:
 - 1) Phase A: Brown.
 - 2) Phase B: Orange.
 - 3) Phase C: Yellow.
 - d. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches (150 mm) from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.
- F. Power-Circuit Conductor Identification, More than 600 V: For conductors in vaults, pull and junction boxes, manholes, and handholes, use write-on tags or nonmetallic plastic tag holder with adhesive-backed phase tags, and a separate tag with the circuit designation.
- G. Install instructional sign including the color-code for grounded and ungrounded conductors using adhesive-film-type labels.
- H. Control-Circuit Conductor Identification: For conductors and cables in pull and junction boxes, manholes, and handholes, use write-on tags or self-adhesive, self-laminating polyester labels with the conductor or cable designation, origin, and destination.

- I. Control-Circuit Conductor Termination Identification: For identification at terminations provide heat-shrink preprinted tubes with the conductor designation.
- J. Conductors to Be Extended in the Future: Attach write-on tags to conductors and list source.
- K. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.
 - 1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
 - 2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
 - 3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual.
- L. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring and optical fiber cable.
 - 1. Limit use of underground-line warning tape to direct-buried cables.
 - 2. Install underground-line warning tape for both direct-buried cables and cables in raceway.
- M. Workspace Indication: Install floor marking tape to show working clearances in the direction of access to live parts. Workspace shall be as required by NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.
- N. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive warning labels] [Baked-enamel warning signs.
 - 1. Comply with 29 CFR 1910.145.
 - 2. Identify system voltage with black letters on an orange background.
 - 3. Apply to exterior of door, cover, or other access.
 - 4. For equipment with multiple power or control sources, apply to door or cover of equipment including, but not limited to, the following:
 - a. Power transfer switches.
 - b. Controls with external control power connections.
- O. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.
- P. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background with minimum **3/8-inch- (10-mm-)** high letters for emergency instructions at equipment used for power transfer and load shedding.
- Q. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.
 - 1. Labeling Instructions:

- a. Indoor Equipment: Adhesive film label. Unless otherwise indicated, provide a single line of text with 1/2-inch- (13-mm-) high letters on 1-1/2-inch- (38-mm-) high label; where two lines of text are required, use labels 2 inches (50 mm) high.
- b. Outdoor Equipment: Engraved, laminated acrylic or melamine label.
- c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
- d. Unless provided with self-adhesive means of attachment, fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.

2. Equipment to Be Labeled:

- a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be engraved, laminated acrylic or melamine label.
- b. Enclosures and electrical cabinets.
- c. Access doors and panels for concealed electrical items.
- d. Switchgear.
- e. Switchboards.
- f. Transformers: Label that includes tag designation shown on Drawings for the transformer, feeder, and panelboards or equipment supplied by the secondary.
- g. Substations.
- h. Emergency system boxes and enclosures.
- i. Motor-control centers.
- j. Enclosed switches.
- k. Enclosed circuit breakers.
- l. Enclosed controllers.
- m. Variable-speed controllers.
- n. Push-button stations.
- o. Power transfer equipment.
- p. Contactors.
- q. Remote-controlled switches, dimmer modules, and control devices.
- r. Battery-inverter units.
- s. Battery racks.
- t. Power-generating units.
- u. Monitoring and control equipment.
- v. UPS equipment.

END OF SECTION 260553

SECTION 260923

LIGHTING CONTROL DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

1. Time switches.
2. Photoelectric switches.
3. Standalone daylight-harvesting switching controls.
4. Indoor occupancy sensors.
5. Outdoor motion sensors.
6. Lighting contactors.
7. Emergency shunt relays.

- B. Related Requirements:

1. Section 262726 "Wiring Devices" for wall-box dimmers, wall-switch occupancy sensors, and manual light switches.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Show installation details for occupancy and light-level sensors.
 1. Interconnection diagrams showing field-installed wiring.
 2. Include diagrams for power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For each type of lighting control device to include in emergency, operation, and maintenance manuals.

PART 2 - PRODUCTS

- A. Electromechanical-Dial Time Switches: Comply with UL 917.
1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 2. Contact Configuration: SPST DPST SPDT, or DPDT.
 3. Contact Rating: 20-A ballast load, 120-/240-V ac.
 4. Circuitry: Allows connection of a photoelectric relay as a substitute for the on-off function of a program.
 5. Astronomic time dial.
 6. Eight-Day Program: Uniquely programmable for each weekday and holidays.
 7. Skip-a-day mode.
 8. Wound-spring reserve carryover mechanism to keep time during power failures, minimum of 16 hours.

2.2 DAYLIGHT-HARVESTING SWITCHING CONTROLS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- B. **Basis-of-Design Product:** Subject to compliance with requirements, provide product indicated on Drawings Insert manufacturer's name; product name or designation or comparable product by one of the following:
1. [Cooper Industries, Inc.](#)
 2. [Eaton Corporation.](#)
 3. [Hubbell Building Automation, Inc.](#)
 4. [Leviton Mfg. Company Inc.](#)
 5. [Lithonia Lighting; Acuity Lighting Group, Inc.](#)
 6. [NSi Industries LLC; TORK Products.](#)
 7. [Sensor Switch, Inc.](#)
 8. [Tyco Electronics; ALR Brand.](#)
 9. [Watt Stopper.](#)
- C. Ceiling-Mounted Switching Controls: Solid-state, light-level sensor unit, with separate power pack, to detect changes in indoor lighting levels that are perceived by the eye.
- D. Electrical Components, Devices, and Accessories:
1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 2. Operating Ambient Conditions: Dry interior conditions, 32 to 120 deg F (0 to 49 deg C).
 3. Sensor Output: Contacts rated to operate the associated power pack, complying with UL 773A. Sensor is powered by the power pack.
 4. Power Pack: Dry contacts rated for [20] <Insert value>-A ballast load at 120- and 277-V ac, for [13] <Insert value>-A tungsten at 120-V ac, and for [1] <Insert value> hp at 120-V ac. Sensor has 24-V dc, 150-mA, Class 2 power source, as defined by NFPA 70.
 5. General Space Sensors Light-Level Monitoring Range: 10 to 200 fc (108 to 2152 lux), with an adjustment for turn-on and turn-off levels within that range.
 6. Atrium Space Sensors Light-Level Monitoring Range: 100 to 1000 fc (1080 to 10 800 lux), with an adjustment for turn-on and turn-off levels within that range.
 7. Skylight Sensors Light-Level Monitoring Range: 1000 to 10,000 fc (10 800 to 108 000 lux), with an adjustment for turn-on and turn-off levels within that range.

8. Time Delay: Adjustable from 5 to 300 seconds to prevent cycling.
9. Set-Point Adjustment: Equip with deadband adjustment of 25, 50, and 75 percent above the "on" set point, or provide with separate adjustable "on" and "off" set points.
10. Test Mode: User selectable, overriding programmed time delay to allow settings check.
11. Control Load Status: User selectable to confirm that load wiring is correct.
12. Indicator: Two digital displays to indicate the beginning of on-off cycles.

2.3 DAYLIGHT-HARVESTING DIMMING CONTROLS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- B. **Basis-of-Design Product:** Subject to compliance with requirements, provide product indicated on Drawings; product name or designation or comparable product by one of the following:
 1. [Cooper Industries, Inc.](#)
 2. [Hubbell Building Automation, Inc.](#)
 3. [Leviton Mfg. Company Inc.](#)
 4. [Lithonia Lighting; Acuity Lighting Group, Inc.](#)
 5. [Watt Stopper.](#)
- C. System Description: Sensing daylight and electrical lighting levels, the system adjusts the indoor electrical lighting levels. As daylight increases, the lights are dimmed.
 1. Lighting control set point is based on two lighting conditions:
 - a. When no daylight is present (target level).
 - b. When significant daylight is present.
 2. System programming is done with two hand-held, remote-control tools.
 - a. Initial setup tool.
 - b. Tool for occupants to adjust the target levels by increasing the set point up to 25 percent, or by minimizing the electric lighting level.
- D. Ceiling-Mounted Dimming Controls: Solid-state, light-level sensor unit, with separate controller unit, to detect changes in lighting levels that are perceived by the eye.
 1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 2. Sensor Output: 0- to 10-V dc to operate electronic dimming ballasts. Sensor is powered by controller unit.
 3. Power Pack: Sensor has 24-V dc, Class 2 power source, as defined by NFPA 70.
 4. Light-Level Sensor Set-Point Adjustment Range: 20 to 60 fc (120 to 640 lux).

2.4 INDOOR OCCUPANCY SENSORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- B. **Basis-of-Design Product:** Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. [Bryant Electric; a Hubbell company.](#)
2. [Cooper Industries, Inc.](#)
3. [Hubbell Building Automation, Inc.](#)
4. [Leviton Mfg. Company Inc.](#)
5. [Lightolier Controls.](#)
6. [Lithonia Lighting; Acuity Lighting Group, Inc.](#)
7. [Lutron Electronics Co., Inc.](#)
8. [NSi Industries LLC; TORK Products.](#)
9. [RAB Lighting.](#)
10. [Sensor Switch, Inc.](#)
11. [Square D; a brand of Schneider Electric.](#)
12. [Watt Stopper.](#)

C. General Requirements for Sensors: Wall- or ceiling-mounted, solid-state indoor occupancy sensors with a separate power pack.

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Operation: Unless otherwise indicated, turn lights on when coverage area is occupied, and turn them off when unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.
3. Sensor Output: Contacts rated to operate the connected relay, complying with UL 773A. Sensor is powered from the power pack.
4. Power Pack: Dry contacts rated for 20-A ballast load at 120- and 277-V ac, for 13-A tungsten at 120-V ac, and for 1 hp at 120-V ac. Sensor has 24-V dc, 150-mA, Class 2 power source, as defined by NFPA 70.
5. Mounting:
 - a. Sensor: Suitable for mounting in any position on a standard outlet box.
 - b. Relay: Externally mounted through a **1/2-inch (13-mm)** knockout in a standard electrical enclosure.
 - c. Time-Delay and Sensitivity Adjustments: Recessed and concealed behind hinged door.
6. Indicator: Digital display, to show when motion is detected during testing and normal operation of sensor.
7. Bypass Switch: Override the "on" function in case of sensor failure.
8. Automatic Light-Level Sensor: Adjustable from **2 to 200 fc (21.5 to 2152 lux)**; turn lights off when selected lighting level is present.

D. PIR Type: Ceiling mounted; detect occupants in coverage area by their heat and movement.

1. Detector Sensitivity: Detect occurrences of **6-inch- (150-mm-)** minimum movement of any portion of a human body that presents a target of not less than **36 sq. in. (232 sq. cm)**.
2. Detection Coverage (Room): Detect occupancy anywhere in a circular area of **1000 sq. ft. (93 sq. m)** when mounted on a **96-inch- (2440-mm-)** high ceiling.
3. Detection Coverage (Corridor): Detect occupancy within **90 feet (27.4 m)** when mounted on a **10-foot- (3-m-)** high ceiling.

E. Ultrasonic Type: Ceiling mounted; detect occupants in coverage area through pattern changes of reflected ultrasonic energy.

1. Detector Sensitivity: Detect a person of average size and weight moving not less than **12 inches (305 mm)** in either a horizontal or a vertical manner at an approximate speed of **12 inches/s (305 mm/s)**.

2. Detection Coverage (Small Room): Detect occupancy anywhere within a circular area of **600 sq. ft. (56 sq. m)** when mounted on a **96-inch- (2440-mm-)** high ceiling.
 3. Detection Coverage (Standard Room): Detect occupancy anywhere within a circular area of **1000 sq. ft. (93 sq. m)** when mounted on a **96-inch- (2440-mm-)** high ceiling.
 4. Detection Coverage (Large Room): Detect occupancy anywhere within a circular area of **2000 sq. ft. (186 sq. m)** when mounted on a **96-inch- (2440-mm-)** high ceiling.
 5. Detection Coverage (Corridor): Detect occupancy anywhere within **90 feet (27.4 m)** when mounted on a **10-foot- (3-m-)** high ceiling in a corridor not wider than **14 feet (4.3 m)**.
- F. Dual-Technology Type: Ceiling mounted; detect occupants in coverage area using PIR and ultrasonic detection methods. The particular technology or combination of technologies that control on-off functions is selectable in the field by operating controls on unit.
1. Sensitivity Adjustment: Separate for each sensing technology.
 2. Detector Sensitivity: Detect occurrences of **6-inch- (150-mm-)** minimum movement of any portion of a human body that presents a target of not less than **36 sq. in. (232 sq. cm)**, and detect a person of average size and weight moving not less than **12 inches (305 mm)** in either a horizontal or a vertical manner at an approximate speed of **12 inches/s (305 mm/s)**.
 3. Detection Coverage (Standard Room): Detect occupancy anywhere within a circular area of **1000 sq. ft. (93 sq. m)** when mounted on a **96-inch- (2440-mm-)** high ceiling.

2.5 SWITCHBOX-MOUNTED OCCUPANCY SENSORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- B. **Basis-of-Design Product:** Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
1. [Bryant Electric; a Hubbell company.](#)
 2. [Cooper Industries, Inc.](#)
 3. [Hubbell Building Automation, Inc.](#)
 4. [Leviton Mfg. Company Inc.](#)
 5. [Lightolier Controls.](#)
 6. [Lithonia Lighting; Acuity Lighting Group, Inc.](#)
 7. [Lutron Electronics Co., Inc.](#)
 8. [NSi Industries LLC; TORK Products.](#)
 9. [RAB Lighting.](#)
 10. [Sensor Switch, Inc.](#)
 11. [Square D; a brand of Schneider Electric.](#)
 12. [Watt Stopper.](#)
- C. General Requirements for Sensors: Automatic-wall-switch occupancy sensor, suitable for mounting in a single gang switchbox.
1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 2. Operating Ambient Conditions: Dry interior conditions, **32 to 120 deg F (0 to 49 deg C)**.
 3. Switch Rating: Not less than 800-VA fluorescent at 120 V, 1200-VA fluorescent at 277 V, and 800-W incandescent.
- D. Wall-Switch Sensor Tag WS1:

1. Standard Range: 180-degree field of view, field adjustable from 180 to 40 degrees; with a minimum coverage area of **2100 sq. ft (196 sq. m)**.
2. Sensing Technology: PIR Dual technology - PIR and ultrasonic.
3. Switch Type: SP, manual "on," automatic "off." SP, field selectable automatic "on," or manual "on" automatic "off."
4. Voltage: Match the circuit voltage.
5. Ambient-Light Override: Concealed, field-adjustable, light-level sensor from **10 to 150 fc (108 to 1600 lux)**. The switch prevents the lights from turning on when the light level is higher than the set point of the sensor.
6. Concealed, field-adjustable, "off" time-delay selector at up to 30 minutes.
7. Concealed "off" time-delay selector at 30 seconds, and 5, 10, and 20 minutes.
8. Adaptive Technology: Self-adjusting circuitry detects and memorizes usage patterns of the space and helps eliminate false "off" switching.

E. Wall-Switch Sensor Tag WS2:

1. Standard Range: 210-degree field of view, with a minimum coverage area of **900 sq. ft. (84 sq. m)**.
2. Sensing Technology: PIR.
3. Switch Type: SP, manual "on," automatic "off."
4. Voltage: Match the circuit voltage type.
5. Ambient-Light Override: Concealed, field-adjustable, light-level sensor from **10 to 150 fc (108 to 1600 lux)**. The switch prevents the lights from turning on when the light level is higher than the set point of the sensor.
6. Concealed, field-adjustable, "off" time-delay selector at up to 30 minutes.
7. Concealed "off" time-delay selector at 30 seconds, and 5, 10, and 20 minutes.
8. Adaptive Technology: Self-adjusting circuitry detects and memorizes usage patterns of the space and helps eliminate false "off" switching.

PART 3 - EXECUTION

3.1 SENSOR INSTALLATION

- A. Coordinate layout and installation of ceiling-mounted devices with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, smoke detectors, fire-suppression systems, and partition assemblies.
- B. Install and aim sensors in locations to achieve not less than 90 percent coverage of areas indicated. Do not exceed coverage limits specified in manufacturer's written instructions.

3.2 CONTACTOR INSTALLATION

- A. Mount electrically held lighting contactors with elastomeric isolator pads to eliminate structure-borne vibration, unless contactors are installed in an enclosure with factory-installed vibration isolators.

3.3 WIRING INSTALLATION

- A. Wiring Method: Comply with Section 260519 "Low-Voltage Electrical Power Conductors and Cables." Minimum conduit size is **1/2 inch (13 mm)**.

- B. Wiring within Enclosures: Comply with NECA 1. Separate power-limited and nonpower-limited conductors according to conductor manufacturer's written instructions.
- C. Size conductors according to lighting control device manufacturer's written instructions unless otherwise indicated.
- D. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.

3.4 IDENTIFICATION

- A. Identify components and power and control wiring according to Section 260553 "Identification for Electrical Systems."
 - 1. Identify controlled circuits in lighting contactors.
 - 2. Identify circuits or luminaires controlled by photoelectric and occupancy sensors at each sensor.
- B. Label time switches and contactors with a unique designation.

3.5 FIELD QUALITY CONTROL

- A. Testing Agency Engage a qualified testing agency to evaluate lighting control devices and perform tests and inspections.
- B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- C. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
 - 1. Operational Test: After installing time switches and sensors, and after electrical circuitry has been energized, start units to confirm proper unit operation.
 - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Lighting control devices will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports.

3.6 ADJUSTING

- A. Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting sensors to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.
 - 1. For occupancy and motion sensors, verify operation at outer limits of detector range. Set time delay to suit Owner's operations.
 - 2. For daylighting controls, adjust set points and deadband controls to suit Owner's operations.
 - 3. Align high-bay occupancy sensors using manufacturer's laser aiming tool.

3.7 DEMONSTRATION

- A. Coordinate demonstration of products specified in this Section with demonstration requirements for low-voltage, programmable lighting control systems specified in Section 260943.13 "Addressable-Fixture Lighting Controls" and Section 260943.23 "Relay-Based Lighting Controls."
- B. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain lighting control devices.

END OF SECTION 260923

SECTION 262726 - WIRING DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Receptacles, receptacles with integral GFCI, and associated device plates.
 - 2. Twist-locking receptacles.
 - 3. Receptacles with integral surge-suppression units.
 - 4. Isolated-ground receptacles.
 - 5. Hospital-grade receptacles.
 - 6. Tamper-resistant receptacles.
 - 7. Weather-resistant receptacles.
 - 8. Snap switches and wall-box dimmers.
 - 9. Solid-state fan speed controls.
 - 10. Wall-switch and exterior occupancy sensors.
 - 11. Communications outlets.
 - 12. Pendant cord-connector devices.
 - 13. Cord and plug sets.
 - 14. Floor service outlets, poke-through assemblies, service poles, and multioutlet assemblies.

1.3 DEFINITIONS

- A. EMI: Electromagnetic interference.
- B. GFCI: Ground-fault circuit interrupter.
- C. Pigtail: Short lead used to connect a device to a branch-circuit conductor.
- D. RFI: Radio-frequency interference.
- E. TVSS: Transient voltage surge suppressor.
- F. UTP: Unshielded twisted pair.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Receptacles for Owner-Furnished Equipment: Match plug configurations.
 - 2. Cord and Plug Sets: Match equipment requirements.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.
- C. Samples: One for each type of device and wall plate specified, in each color specified.

1.6 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

1.7 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing-label warnings and instruction manuals that include labeling conditions.

1.8 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Service/Power Poles: One for every 10, but no fewer than one.
 - 2. Floor Service-Outlet Assemblies: One for every 10, but no fewer than one.
 - 3. Poke-Through, Fire-Rated Closure Plugs: One for every five floor service outlets installed, but no fewer than two.
 - 4. TVSS Receptacles: One for every 10 of each type installed, but no fewer than two of each type.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. **Manufacturers' Names:** Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:
 - 1. [Cooper Wiring Devices; Division of Cooper Industries, Inc. \(Cooper\)](#).
 - 2. [Hubbell Incorporated; Wiring Device-Kellems \(Hubbell\)](#).
 - 3. [Leviton Mfg. Company Inc. \(Leviton\)](#).
 - 4. [Pass & Seymour/Legrand \(Pass & Seymour\)](#).
 - 5. Legrand.
- B. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

2.2 GENERAL WIRING-DEVICE REQUIREMENTS

- A. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NFPA 70.
- C. Devices that are manufactured for use with modular plug-in connectors may be substituted under the following conditions:
 - 1. Connectors shall comply with UL 2459 and shall be made with stranding building wire.
 - 2. Devices shall comply with the requirements in this Section.

2.3 STRAIGHT-BLADE RECEPTACLES

- A. Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.
 - 1. **Products:** Subject to compliance with requirements, provide one of the following:
 - a. [Cooper; 5351 \(single\), CR5362 \(duplex\).](#)
 - b. [Hubbell; HBL5351 \(single\), HBL5352 \(duplex\).](#)
 - c. [Leviton; 5891 \(single\), 5352 \(duplex\).](#)
 - d. [Pass & Seymour; 5361 \(single\), 5362 \(duplex\).](#)
- B. Hospital-Grade, Duplex Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498 Supplement sd, and FS W-C-596.
 - 1. **Products:** Subject to compliance with requirements, provide one of the following:
 - a. [Cooper; 8310 \(single\), 8300 \(duplex\).](#)
 - b. [Hubbell; HBL8310 \(single\), HBL8300 \(duplex\).](#)
 - c. [Leviton; 8310 \(single\), 8300 \(duplex\).](#)
 - d. [Pass & Seymour; 8301 \(single\), 8300H \(duplex\).](#)
 - 2. **Description:** Single-piece, rivetless, nickel-plated, all-brass grounding system. Nickel-plated, brass mounting strap.
- C. Isolated-Ground, Duplex Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.
 - 1. **Products:** Subject to compliance with requirements, provide one of the following:
 - a. [Cooper; IG5362RN.](#)
 - b. [Hubbell; IG5362.](#)
 - c. [Leviton; 5362-IG.](#)
 - d. [Pass & Seymour; IG5362.](#)
 - 2. **Description:** Straight blade; equipment grounding contacts shall be connected only to the green grounding screw terminal of the device and with inherent electrical isolation from mounting strap. Isolation shall be integral to receptacle construction and not dependent on removable parts.

- D. Tamper-Resistant Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498 Supplement sd, and FS W-C-596.
1. **Products:** Subject to compliance with requirements, provide one of the following:
 - a. [Cooper; TR8300.](#)
 - b. [Hubbell; HBL8300SGA.](#)
 - c. [Leviton; 8300-SGG.](#)
 - d. [Pass & Seymour; TR63H.](#)
 2. Description: Labeled shall comply with NFPA 70, "Health Care Facilities" Article, "Pediatric Locations" Section.

2.4 GFCI RECEPTACLES

- A. General Description:
1. Straight blade, feed or non-feed -through type.
 2. Comply with NEMA WD 1, NEMA WD 6, UL 498, UL 943 Class A, and FS W-C-596.
 3. Include indicator light that shows when the GFCI has malfunctioned and no longer provides proper GFCI protection.
- B. Duplex GFCI Convenience Receptacles, 125 V, 20 A:
1. **Products:** Subject to compliance with requirements, provide one of the following:
 - a. [Cooper; VGF20.](#)
 - b. [Hubbell; GFR5352L.](#)
 - c. [Pass & Seymour; 2095.](#)
 - d. [Leviton; 7590.](#)
- C. Tamper-Resistant GFCI Convenience Receptacles, 125 V, 20 A:
1. **Products:** Subject to compliance with requirements, provide one of the following:
 - a. [Hubbell; GFTR20.](#)
 - b. [Pass & Seymour; 2095TR.](#)
- D. Hospital-Grade, Duplex GFCI Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498 Supplement sd, and FS W-C-596.
1. **Products:** Subject to compliance with requirements, provide one of the following:
 - a. [Cooper; VGFH20.](#)
 - b. [Hubbell; HFR8300HL.](#)
 - c. [Leviton; 7899-HG.](#)
 - d. [Pass & Seymour; 2095HG.](#)

2.5 TVSS RECEPTACLES

- A. General Description: Comply with NEMA WD 1, NEMA WD 6, UL 498, UL 1449, and FS W-C-596, with integral TVSS in line to ground, line to neutral, and neutral to ground.

1. TVSS Components: Multiple metal-oxide varistors; with a nominal clamp-level rating of 400 V and minimum single transient pulse energy dissipation of 240 J, according to IEEE C62.41.2 and IEEE C62.45.
2. Active TVSS Indication: Visual and audible, with light visible in face of device to indicate device is "active" or "no longer in service."

B. Duplex TVSS Convenience Receptacles:

1. **Products:** Subject to compliance with requirements, provide one of the following:
 - a. [Cooper; 5362BLS.](#)
 - b. [Hubbell; HBL5362SA.](#)
 - c. [Leviton; 5380.](#)
 - d. [Pass & Seymour; 5362BLSP.](#)
2. Description: Straight blade, 125 V, 20 A; NEMA WD 6 Configuration 5-20R.

C. Isolated-Ground, Duplex Convenience Receptacles:

1. **Products:** Subject to compliance with requirements, provide one of the following:
 - a. [Cooper; IG5362BLS.](#)
 - b. [Hubbell; IG5362SA.](#)
 - c. [Leviton; 5380-IG.](#)
 - d. [Pass & Seymour; IG5362BLSP.](#)
2. Description:
 - a. Straight blade, 125 V, 20 A; NEMA WD 6 Configuration 5-20R.
 - b. Equipment grounding contacts shall be connected only to the green grounding screw terminal of the device and with inherent electrical isolation from mounting strap. Isolation shall be integral to receptacle construction and not dependent on removable parts.

D. Hospital-Grade, Duplex Convenience Receptacles: Comply with UL 498 Supplement sd.

1. **Products:** Subject to compliance with requirements, provide one of the following:
 - a. [Cooper; 8300BLS.](#)
 - b. [Hubbell; HBL8362SA.](#)
 - c. [Leviton; 8380.](#)
 - d. [Pass & Seymour; 8300BLSP.](#)
2. Description: Straight blade, 125 V, 20 A; NEMA WD 6 Configuration 5-20R.
3. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
4. Comply with NFPA 70.

E. Isolated-Ground, Hospital-Grade, Duplex Convenience Receptacles:

1. **Products:** Subject to compliance with requirements, provide one of the following:
 - a. [Cooper; IG8300HGBLS.](#)
 - b. [Hubbell; IG8362SA.](#)

- c. [Leviton; 8380-IG.](#)
- d. [Pass & Seymour; IG8300BLSP.](#)

2. Description:

- a. Straight blade, 125 V, 20 A; NEMA WD 6 Configuration 5-20R.
- b. Comply with UL 498 Supplement sd.
- c. Equipment grounding contacts shall be connected only to the green grounding screw terminal of the device and with inherent electrical isolation from mounting strap. Isolation shall be integral to receptacle construction and not dependent on removable parts.

2.6 HAZARDOUS (CLASSIFIED) LOCATION RECEPTACLES

A. Wiring Devices for Hazardous (Classified) Locations: Comply with NEMA FB 11 and UL 1010.

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- 2. [Basis-of-Design Product](#): Subject to compliance with requirements, provide product indicated on Drawings designation or comparable product by one of the following:
 - a. [Cooper Crouse-Hinds.](#)
 - b. [EGS/Appleton Electric.](#)
 - c. [Killark; Division of Hubbell Inc.](#)

2.7 TWIST-LOCKING RECEPTACLES

A. Single Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration L5-20R, and UL 498.

- 1. [Products](#): Subject to compliance with requirements, provide one of the following:
 - a. [Cooper; CWL520R.](#)
 - b. [Hubbell; HBL2310.](#)
 - c. [Leviton; 2310.](#)
 - d. [Pass & Seymour; L520-R.](#)

B. Isolated-Ground, Single Convenience Receptacles, 125 V, 20 A:

- 1. [Products](#): Subject to compliance with requirements, provide one of the following:
 - a. [Cooper; IGL520R.](#)
 - b. [Hubbell; IG2310.](#)
 - c. [Leviton; 2310-IG.](#)
 - d. [Pass & Seymour; IG4700.](#)
- 2. Description:
 - a. Comply with NEMA WD 1, NEMA WD 6 Configuration L5-20R, and UL 498.
 - b. Equipment grounding contacts shall be connected only to the green grounding screw terminal of the device and with inherent electrical isolation from mounting strap. Isolation shall be integral to receptacle construction and not dependent on removable parts.

2.8 PENDANT CORD-CONNECTOR DEVICES

A. Description:

1. Matching, locking-type plug and receptacle body connector.
2. NEMA WD 6 Configurations L5-20P and L5-20R, heavy-duty grade, and FS W-C-596.
3. Body: Nylon, with screw-open, cable-gripping jaws and provision for attaching external cable grip.
4. External Cable Grip: Woven wire-mesh type made of high-strength, galvanized-steel wire strand, matched to cable diameter, and with attachment provision designed for corresponding connector.

2.9 CORD AND PLUG SETS

A. Description:

1. Match voltage and current ratings and number of conductors to requirements of equipment being connected.
2. Cord: Rubber-insulated, stranded-copper conductors, with Type SOW-A jacket; with green-insulated grounding conductor and ampacity of at least 130 percent of the equipment rating.
3. Plug: Nylon body and integral cable-clamping jaws. Match cord and receptacle type for connection.

2.10 TOGGLE SWITCHES

A. Comply with NEMA WD 1, UL 20, and FS W-S-896.

B. Switches, 120/277 V, 20 A:

1. Products: Subject to compliance with requirements, provide one of the following: Catalog numbers in lists below are for 20-A devices; revise catalog numbers to require other configurations and ratings.

Single Pole:

- 1) Cooper; AH1221.
- 2) Hubbell; HBL1221.
- 3) Leviton; 1221-2.
- 4) Pass & Seymour; CSB20AC1.

Two Pole:

- 5) Cooper; AH1222.
- 6) Hubbell; HBL1222.
- 7) Leviton; 1222-2.
- 8) Pass & Seymour; CSB20AC2.

Three Way:

- 9) Cooper; AH1223.
- 10) Hubbell; HBL1223.
- 11) Leviton; 1223-2.

12) [Pass & Seymour; CSB20AC3.](#)

[Four Way:](#)

13) [Cooper; AH1224.](#)

14) [Hubbell; HBL1224.](#)

15) [Leviton; 1224-2.](#)

16) [Pass & Seymour; CSB20AC4.](#)

C. Pilot-Light Switches, 20 A:

1. [Products:](#) Subject to compliance with requirements, provide one of the following:

a. [Cooper; AH1221PL for 120 and 277 V.](#)

b. [Hubbell; HBL1201PL for 120 and 277 V.](#)

c. [Leviton; 1221-LH1.](#)

d. [Pass & Seymour; PS20AC1RPL for 120 V, PS20AC1RPL7 for 277 V.](#)

2. Description: Single pole, with neon-lighted handle, illuminated when switch is "off."

D. Key-Operated Switches, 120/277 V, 20 A:

1. [Products:](#) Subject to compliance with requirements, provide one of the following:

a. [Cooper; AH1221L.](#)

b. [Hubbell; HBL1221L.](#)

c. [Leviton; 1221-2L.](#)

d. [Pass & Seymour; PS20AC1-L.](#)

2. Description: Single pole, with factory-supplied key in lieu of switch handle.

E. Single-Pole, Double-Throw, Momentary-Contact, Center-off Switches: 120/277 V, 20 A; for use with mechanically held lighting contactors.

1. [Products:](#) Subject to compliance with requirements, provide one of the following:

a. [Cooper; 1995.](#)

b. [Hubbell; HBL1557.](#)

c. [Leviton; 1257.](#)

d. [Pass & Seymour; 1251.](#)

F. Key-Operated, Single-Pole, Double-Throw, Momentary-Contact, Center-off Switches: 120/277 V, 20 A; for use with mechanically held lighting contactors, with factory-supplied key in lieu of switch handle.

1. [Products:](#) Subject to compliance with requirements, provide one of the following:

a. [Cooper; 1995L.](#)

b. [Hubbell; HBL1557L.](#)

c. [Leviton; 1257L.](#)

d. [Pass & Seymour; 1251L.](#)

2.11 DECORATOR-STYLE DEVICES

- A. Convenience Receptacles: Square face, 125 V, 15 A; comply with NEMA WD 1, NEMA WD 6 Configuration 5-15R, and UL 498.
1. **Products:** Subject to compliance with requirements, provide one of the following:
 - a. [Cooper; 6252.](#)
 - b. [Hubbell; DR15.](#)
 - c. [Leviton; 16252.](#)
 - d. [Pass & Seymour; 26252.](#)
- B. Tamper-Resistant Convenience Receptacles: Square face, 125 V, 15 A; comply with NEMA WD 1, NEMA WD 6 Configuration 5-15R, and UL 498.
1. **Products:** Subject to compliance with requirements, provide one of the following:
 - a. [Cooper; TR6252.](#)
 - b. [Hubbell; DR15TR.](#)
 - c. [Pass & Seymour; TR26252.](#)
 2. **Description:** Labeled to comply with NFPA 70, "Receptacles, Cord Connectors, and Attachment Plugs (Caps)" Article, "Tamper-Resistant Receptacles in Dwelling Units" Section.
- C. Tamper-Resistant and Weather-Resistant Convenience Receptacles: Square face, 125 V, 15 A; comply with NEMA WD 1, NEMA WD 6 Configuration 5-15R, and UL 498.
1. **Products:** Subject to compliance with requirements, provide one of the following:
 - a. [Cooper; TWRBR15.](#)
 - b. [Hubbell; DR15TR.](#)
 - c. [LevitonTRW15.](#)
 - d. [Pass & Seymour; TRW26252.](#)
 2. **Description:** Labeled to comply with NFPA 70, "Receptacles, Cord Connectors, and Attachment Plugs (Caps)" Article, "Tamper-Resistant Receptacles in Dwelling Units" Section, when installed in wet and damp locations.
 3. **Description:** Labeled to comply with NFPA 70, "Receptacles, Cord Connectors, and Attachment Plugs (Caps)" Article, "Tamper-Resistant Receptacles in Dwelling Units" Section.

2.12 WALL-BOX DIMMERS

- A. Dimmer Switches: Modular, full-wave, solid-state units with integral, quiet on-off switches, with audible frequency and EMI/RFI suppression filters.
- B. Control: Continuously adjustable toggle switch; with single-pole or three-way switching. Comply with UL 1472.
- C. Incandescent Lamp Dimmers: 120 V; control shall follow square-law dimming curve. On-off switch positions shall bypass dimmer module.

1. 600 W; dimmers shall require no derating when ganged with other devices.
- D. Fluorescent Lamp Dimmer Switches: Modular; compatible with dimmer ballasts; trim potentiometer to adjust low-end dimming; dimmer-ballast combination capable of consistent dimming with low end not greater than 20 percent of full brightness.

2.13 WALL PLATES

- A. Single and combination types shall match corresponding wiring devices.
1. Plate-Securing Screws: Metal with head color to match plate finish.
 2. Material for Finished Spaces: Smooth, high-impact thermoplastic **0.035-inch- (1-mm)** .
 3. Material for Unfinished Spaces: Smooth, high-impact thermoplastic.
 4. Material for Damp Locations: Thermoplastic with spring-loaded lift cover, and listed and labeled for use in wet and damp locations.
- B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weather-resistant, thermoplastic with lockable cover.

2.14 FINISHES

- A. Device Color:
1. Wiring Devices Connected to Normal Power System: As selected by Architect unless otherwise indicated or required by NFPA 70 or device listing.
 2. Wiring Devices Connected to Emergency Power System: Red.
 3. TVSS Devices: Blue.
 4. Isolated-Ground Receptacles: Orange.
- B. Wall Plate Color: For plastic covers, match device color.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.
- B. Coordination with Other Trades:
1. Protect installed devices and their boxes. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of boxes.
 2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
 3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
 4. Install wiring devices after all wall preparation, including painting, is complete.
- C. Conductors:

1. Do not strip insulation from conductors until right before they are spliced or terminated on devices.
 2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
 3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
 4. Existing Conductors:
 - a. Cut back and pigtail, or replace all damaged conductors.
 - b. Straighten conductors that remain and remove corrosion and foreign matter.
 - c. Pigtailling existing conductors is permitted, provided the outlet box is large enough.
- D. Device Installation:
1. Replace devices that have been in temporary use during construction and that were installed before building finishing operations were complete.
 2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
 3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
 4. Connect devices to branch circuits using pigtails that are not less than **6 inches (152 mm)** in length.
 5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, two-thirds to three-fourths of the way around terminal screw.
 6. Use a torque screwdriver when a torque is recommended or required by manufacturer.
 7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
 8. Tighten unused terminal screws on the device.
 9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.
- E. Receptacle Orientation:
1. Install ground pin of vertically mounted receptacles up, and on horizontally mounted receptacles to the right.
 2. Install hospital-grade receptacles in patient-care areas with the ground pin or neutral blade at the top.
- F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.
- G. Dimmers:
1. Install dimmers within terms of their listing.
 2. Verify that dimmers used for fan speed control are listed for that application.
 3. Install unshared neutral conductors on line and load side of dimmers according to manufacturers' device listing conditions in the written instructions.
- H. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.
- I. Adjust locations of floor service outlets and service poles to suit arrangement of partitions and furnishings.

3.2 GFCI RECEPTACLES

- A. Install non-feed-through-type GFCI receptacles where protection of downstream receptacles is not required.

3.3 IDENTIFICATION

- A. Comply with Section 260553 "Identification for Electrical Systems."
- B. Identify each receptacle with panelboard identification and circuit number. Use hot, stamped, or engraved machine printing with white-filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.

3.4 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
 - 1. In healthcare facilities, prepare reports that comply with recommendations in NFPA 99.
 - 2. Test Instruments: Use instruments that comply with UL 1436.
 - 3. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated digital-display indicators of measurement.
- B. Tests for Convenience Receptacles:
 - 1. Line Voltage: Acceptable range is 105 to 132 V.
 - 2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is unacceptable.
 - 3. Ground Impedance: Values of up to 2 ohms are acceptable.
 - 4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
 - 5. Using the test plug, verify that the device and its outlet box are securely mounted.
 - 6. Tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.
- C. Test straight-blade convenience outlets in patient-care areas for the retention force of the grounding blade according to NFPA 99. Retention force shall be not less than 4 oz. (115 g).
- D. Wiring device will be considered defective if it does not pass tests and inspections.
- E. Prepare test and inspection reports.

END OF SECTION 262726

SECTION 262743

ELECTRIC-VEHICLE SERVICE EQUIPMENT - AC LEVEL 1 AND LEVEL 2 PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes EVSE that provides AC Level 1 and Level 2 EV charging.

1.3 DEFINITIONS

- A. EV: Electric vehicle.
- B. EV Cable: The off-board cable containing the conductor(s) to connect the EV power controller to the EV that provides both power and communications during energy transfer.
- C. EV Charger or EV Charging Equipment: See "EVSE."
- D. EV Connector: A conductive device that, when electrically coupled to an EV inlet, establishes an electrical connection to the EV for the purpose of power transfer and information exchange. This device is part of the EV coupler.
- E. EV Coupler: A mating EV inlet and connector set.
- F. EV Inlet: The device in the vehicle into which the EV connector is inserted, and a conductive connection is made for the transfer of power and communication. This device is part of the EV coupler.
- G. EVSE: Electric-Vehicle Supply Equipment. It includes the EV charging equipment and conductors, including the ungrounded, grounded, and equipment grounding conductors and EV cables, attachment plugs, and all other fittings, devices, power outlets, or apparatus installed specifically for transferring energy between the premise wiring and the EV.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for EV charging equipment.
 - 2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

- B. Shop Drawings: For EVSE.
 - 1. Include plans, elevations, sections, and mounting details.
 - 2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 3. Detail fabrication and assembly of mounting assemblies for EV charging equipment.
 - 4. Include diagrams for power, signal, and control wiring.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For EVSE to include in operation and maintenance manuals.
- B. Software and Firmware Operational Documentation:
 - 1. Software operating manuals.
 - 2. Program Software Backup: On USB, CD, Cloud, or approved media, complete with configuration files.
 - 3. Device address and password list.
 - 4. Printout of software application and graphic screens.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

1.7 FIELD CONDITIONS

- A. Rate equipment for continuous operation under the following conditions unless otherwise indicated:
 - 1. Ambient Temperature: Not exceeding minus 22 to plus 122 deg F (minus 30 to plus 50 deg C).
 - 2. Altitude: Not exceeding 6600 feet (2000 m).

1.8 WARRANTY

- A. Manufacturer's Warranty: Manufacturer and Installer agree to repair or replace components of EVSE that fail(s) in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Five year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Aerovironment.
 2. Blink.
 3. Bosch Automotive Service Solutions.
 4. ChargePoint.
 5. Clipper Creek, Inc.
 6. Eaton.
 7. EVoCharge.
 8. General Electric Company.
 9. Hubbell Incorporated.
 10. Legrand US.
 11. Leviton Manufacturing Co., Inc.
 12. Schneider Electric USA, Inc.
 13. Siemens Industry, Inc., Energy Management Division.
- B. Source Limitations: Obtain EVSE from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: EVSE shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
1. The term "withstand" means "the unit will remain in place without separation of any parts when subjected to the seismic forces specified."
 2. Component Importance Factor: As per structural specifications.
- B. Ambient Temperature: 5 to 104 deg F (Minus 15 to plus 40 deg C).
- C. Relative Humidity: Zero to 95 percent.
- D. Altitude: Sea level to 5000 feet (1500 m).
- E. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
- F. Surge Withstand: 6 kV at 3000 A.
- G. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
- H. EV Charging Levels:
1. Dual vehicles, AC Level 2 at up to 19.2 kW per vehicle.

2.3 EVSE DESCRIPTION

- A. Comply with NFPA 70.
- B. Comply with:
 - 1. UL 2231-1.
 - 2. UL 2594.
 - 3. SAE J1772 for SAE combo chargers.
- C. Comply with ADA-ABA Accessibility Guidelines.
- D. Control Power: 20 A, 110/120-V ac, 60 Hz, single phase per charger.
- E. Input Power:
 - 1. Two 40 A, 208/240-V ac, 60 Hz, single-phase services per charger.
 - 2. Dual circuits shall be interlocked.
- F. Integral GFCI.
- G. Auto-GFCI fault retry.
- H. EVSE Mounting: Pedestal mount.
- I. Enclosures:
 - 1. Rated for environmental conditions at installed location.
 - a. Outdoor Locations: NEMA 250, Type 3R.
 - b. Stainless steel, Aluminum, Composite or UV-resistant plastic.
 - c. Paint, Powder coat, Thermoset, polyester powder paint or Anodized.
 - d. Lockable.
 - e. Tamper resistant.
- J. EV Cable and Connectors:
 - 1. SAE J1772 connector.
 - 2. Double connectors with locking holster.
 - 3. Minimum 10-foot (3-m) cable with cable management system.
 - 4. Field-replaceable connector and cable assembly.
- K. Status Indicators:
 - 1. LEDs to indicate power, charging, charging complete, system status, faults, and service.
- L. Display Screen:
 - 1. Daylight viewable, UV-protected display with human-machine interface capability.
 - 2. Displays power, charging, charging complete, remote control, system status, faults, and service.

2.4 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by utilizing cushioning materials or foam or by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for EVSE electrical conduit to verify actual locations of conduit connections before equipment installation.
- C. Examine pavement for suitable conditions where EVSE will be installed.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with NECA 1 and NECA 413.
- B. Concrete Base Mounting:
 - 1. Install EVSE on 6-inch (150-mm) nominal-thickness concrete base. Comply with requirements for concrete base specified in Section 033000 "Cast-in-Place Concrete."
 - a. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch (450-mm) centers around the full perimeter of concrete base.
 - b. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
 - c. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - d. Install anchor bolts to elevations required for proper attachment to supported equipment.
 - e. Secure EVSE to concrete base according to manufacturer's written instructions.
- C. Wiring Method: Install cables in raceways. Conceal raceway and cables except in unfinished spaces.
 - 1. Comply with requirements for raceways and boxes specified in Section 260533 "Raceways and Boxes for Electrical Systems."

- D. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Install lacing bars and distribution spools.
- E. Disconnect: Install disconnect in a readily accessible location according to Section 262816 "Enclosed Switches and Circuit Breakers."
- F. Circuit Breakers: Comply with Section 262816 "Enclosed Switches and Circuit Breakers."
- G. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking from enclosures and components.
- H. Secure covers to enclosure.

3.3 CONNECTIONS

- A. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
- B. Comply with grounding requirements in Section 260526 "Grounding and Bonding for Electrical Systems."
- C. Comply with requirements for installation of conduit in Section 260533 "Raceways and Boxes for Electrical Systems." Drawings indicate general arrangement of conduit, fittings, and specialties.
- D. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.
- E. Verify that all electrical connections have been made according to the manufacturer's instructions. Remove all burrs, shavings, and detritus from inside the enclosure.
- F. After confirming all connections, install covers and tighten fasteners to according to manufacturer's instructions.

3.4 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.5 DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate, and maintain EV charging equipment.

END OF SECTION 262743

SECTION 262813

FUSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Cartridge fuses rated 600-V ac and less for use in control circuits enclosed switches panelboards switchboards enclosed controllers and motor-control centers.
 - 2. Plug fuses rated 125-V ac and less for use in plug-fuse-type enclosed switches fuseholders and panelboards.
 - 3. Plug-fuse adapters for use in Edison-base, plug-fuse sockets.
 - 4. Spare-fuse cabinets.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material, dimensions, descriptions of individual components, and finishes for spare-fuse cabinets. Include the following for each fuse type indicated:
 - 1. Ambient Temperature Adjustment Information: If ratings of fuses have been adjusted to accommodate ambient temperatures, provide list of fuses with adjusted ratings.
 - a. For each fuse having adjusted ratings, include location of fuse, original fuse rating, local ambient temperature, and adjusted fuse rating.
 - b. Provide manufacturer's technical data on which ambient temperature adjustment calculations are based.
 - 2. Dimensions and manufacturer's technical data on features, performance, electrical characteristics, and ratings.
 - 3. Current-limitation curves for fuses with current-limiting characteristics.
 - 4. Time-current coordination curves (average melt) and current-limitation curves (instantaneous peak let-through current) for each type and rating of fuse.
 - 5. Coordination charts and tables and related data.
 - 6. Fuse sizes for elevator feeders and elevator disconnect switches.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For fuses to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:

1. Ambient temperature adjustment information.
2. Current-limitation curves for fuses with current-limiting characteristics.
3. Time-current coordination curves (average melt) and current-limitation curves (instantaneous peak let-through current) for each type and rating of fuse.
4. Coordination charts and tables and related data.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than two of each size and type.

1.6 QUALITY ASSURANCE

- A. Source Limitations: Obtain fuses, for use within a specific product or circuit, from single source from single manufacturer.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Comply with NEMA FU 1 for cartridge fuses.
- D. Comply with NFPA 70.
- E. Comply with UL 248-11 for plug fuses.

1.7 PROJECT CONDITIONS

- A. Where ambient temperature to which fuses are directly exposed is less than **40 deg F (5 deg C)** or more than **100 deg F (38 deg C)**, apply manufacturer's ambient temperature adjustment factors to fuse ratings.

1.8 COORDINATION

- A. Coordinate fuse ratings with utilization equipment nameplate limitations of maximum fuse size and with system short-circuit current levels.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Cooper Bussmann, Inc.
 2. Edison Fuse, Inc.
 3. Ferraz Shawmut, Inc.

4. [Littelfuse, Inc.](#)

2.2 CARTRIDGE FUSES

- A. Characteristics: NEMA FU 1, nonrenewable cartridge fuses with voltage ratings consistent with circuit voltages.

2.3 PLUG FUSES

- A. Characteristics: UL 248-11, nonrenewable plug fuses; 125-V ac.

2.4 PLUG-FUSE ADAPTERS

- A. Characteristics: Adapters for using Type S, rejection-base plug fuses in Edison-base fuseholders or sockets; ampere ratings matching fuse ratings; irremovable once installed.

2.5 SPARE-FUSE CABINET

- A. Characteristics: Wall-mounted steel unit with full-length, recessed piano-hinged door and key-coded cam lock and pull.
 1. Size: Adequate for storage of spare fuses specified with 15 percent spare capacity minimum.
 2. Finish: Gray, baked enamel.
 3. Identification: "SPARE FUSES" in 1-1/2-inch- (38-mm-) high letters on exterior of door.
 4. Fuse Pullers: For each size of fuse, where applicable and available, from fuse manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine fuses before installation. Reject fuses that are moisture damaged or physically damaged.
- B. Examine holders to receive fuses for compliance with installation tolerances and other conditions affecting performance, such as rejection features.
- C. Examine utilization equipment nameplates and installation instructions. Install fuses of sizes and with characteristics appropriate for each piece of equipment.
- D. Evaluate ambient temperatures to determine if fuse rating adjustment factors must be applied to fuse ratings.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install fuses in fusible devices. Arrange fuses so rating information is readable without removing fuse.
- B. Install plug-fuse adapters in Edison-base fuseholders and sockets. Ensure that adapters are irremovable once installed.
- C. Install spare-fuse cabinet(s).

3.3 IDENTIFICATION

- A. Install labels complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems" and indicating fuse replacement information on inside door of each fused switch and adjacent to each fuse block, socket, and holder.

END OF SECTION 262813

SECTION 262816 –

ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Fusible switches.
 - 2. Nonfusible switches.
 - 3. Receptacle switches.
 - 4. Shunt trip switches.
 - 5. Molded-case circuit breakers (MCCBs).
 - 6. Molded-case switches.
 - 7. Enclosures.

1.3 DEFINITIONS

- A. NC: Normally closed.
- B. NO: Normally open.
- C. SPDT: Single pole, double throw.

1.4 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Enclosed switches and circuit breakers shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - 1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.
 - 1. Enclosure types and details for types other than NEMA 250, Type 1.
 - 2. Current and voltage ratings.
 - 3. Short-circuit current ratings (interrupting and withstand, as appropriate).

4. Include evidence of NRTL listing for series rating of installed devices.
 5. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices, accessories, and auxiliary components.
 6. Include time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device.
- B. Shop Drawings: For enclosed switches and circuit breakers. Include plans, elevations, sections, details, and attachments to other work.
1. Wiring Diagrams: For power, signal, and control wiring.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified testing agency.
- B. Seismic Qualification Certificates: For enclosed switches and circuit breakers, accessories, and components, from manufacturer.
1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- C. Field quality-control reports.
1. Test procedures used.
 2. Test results that comply with requirements.
 3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.
- D. Manufacturer's field service report.

1.7 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For enclosed switches and circuit breakers to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:
1. Manufacturer's written instructions for testing and adjusting enclosed switches and circuit breakers.
 2. Time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device.

1.8 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.
2. Fuse Pullers: Two for each size and type.

1.9 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Member company of NETA or an NRTL.
 1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.
- B. Source Limitations: Obtain enclosed switches and circuit breakers, overcurrent protective devices, components, and accessories, within same product category, from single source from single manufacturer.
- C. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- E. Comply with NFPA 70.

1.10 PROJECT CONDITIONS

- A. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:
 1. Ambient Temperature: Not less than **minus 22 deg F (minus 30 deg C)** and not exceeding **104 deg F (40 deg C)**.
 2. Altitude: Not exceeding **6600 feet (2010 m)**.

1.11 COORDINATION

- A. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

PART 2 - PRODUCTS

2.1 FUSIBLE SWITCHES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.

2. [General Electric Company; GE Consumer & Industrial - Electrical Distribution.](#)
 3. [Siemens Energy & Automation, Inc.](#)
 4. [Square D; a brand of Schneider Electric.](#)
- C. Type GD, General Duty, Single Throw, 240-V ac, 800 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, with plug fuse interiors to accommodate specified fuses, lockable handle with capability to accept two padlocks, and interlocked with cover in closed position.
- D. Type HD, Heavy Duty, Single Throw, 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate specified fuses, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.
- E. Type HD, Heavy Duty, Six Pole, Single Throw, 600-V ac, 200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate specified fuses, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.
- F. Type HD, Heavy Duty, Double Throw, 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate specified fuses, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.
- G. Accessories:
1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
 2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
 3. Isolated Ground Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
 4. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
 5. Auxiliary Contact Kit: Two NO/NC (Form "C") auxiliary contact(s), arranged to activate before switch blades open.
 6. Hookstick Handle: Allows use of a hookstick to operate the handle.
 7. Lugs: Mechanical type, suitable for number, size, and conductor material.
 8. Service-Rated Switches: Labeled for use as service equipment.

2.2 NONFUSIBLE SWITCHES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- B. **Basis-of-Design Product:** Subject to compliance with requirements, provide product indicated on Drawings comparable product by one of the following:
1. [Eaton Electrical Inc.; Cutler-Hammer Business Unit.](#)
 2. [General Electric Company; GE Consumer & Industrial - Electrical Distribution.](#)
 3. [Siemens Energy & Automation, Inc.](#)
 4. [Square D; a brand of Schneider Electric.](#)
- C. Type GD, General Duty, Single Throw, 600 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept two padlocks, and interlocked with cover in closed position.

- D. Type HD, Heavy Duty, Single Throw, 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.
- E. Type HD, Heavy Duty, Six Pole, Single Throw, 600-V ac, 200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.
- F. Type HD, Heavy Duty, Double Throw, 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.
- G. Accessories:
 - 1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
 - 2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
 - 3. Isolated Ground Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
 - 4. Auxiliary Contact Kit: One NO/NC (Form "C") auxiliary contact(s), arranged to activate before switch blades open.
 - 5. Hookstick Handle: Allows use of a hookstick to operate the handle.
 - 6. Lugs: Mechanical type, suitable for number, size, and conductor material.

2.3 RECEPTACLE SWITCHES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- B. **Basis-of-Design Product:** Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - 1. [Eaton Electrical Inc.; Cutler-Hammer Business Unit.](#)
 - 2. [General Electric Company; GE Consumer & Industrial - Electrical Distribution.](#)
 - 3. [Siemens Energy & Automation, Inc.](#)
 - 4. [Square D; a brand of Schneider Electric.](#)
- C. Type HD, Heavy-Duty, Single-Throw Fusible Switch: 600-V ac, 100 A; UL 98 and NEMA KS 1; horsepower rated, with clips or bolt pads to accommodate indicated fuses; lockable handle with capability to accept three padlocks; interlocked with cover in closed position.
- D. Type HD, Heavy-Duty, Single-Throw Nonfusible Switch: 600-V ac, 100 A; UL 98 and NEMA KS 1; horsepower rated, lockable handle with capability to accept three padlocks; interlocked with cover in closed position.
- E. Interlocking Linkage: Provided between the receptacle and switch mechanism to prevent inserting or removing plug while switch is in the on position, inserting any plug other than specified, and turning switch on if an incorrect plug is inserted or correct plug has not been fully inserted into the receptacle.
- F. Receptacle: Polarized, three-phase, four-wire receptacle (fourth wire connected to enclosure ground lug).

1. Receptacle Manufacturer and Catalog Number:

2.4 SHUNT TRIP SWITCHES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- B. **Basis-of-Design Product:** Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 1. [Cooper Bussmann, Inc.](#)
 2. [Ferraz Shawmut, Inc.](#)
 3. [Littelfuse, Inc.](#)
- C. General Requirements: Comply with ASME A17.1, UL 50, and UL 98, with 200-kA interrupting and short-circuit current rating when fitted with Class J fuses.
- D. Switches: Three-pole, horsepower rated, with integral shunt trip mechanism and Class J fuse block; lockable handle with capability to accept three padlocks; interlocked with cover in closed position.
- E. Accessories:
 1. Oiltight key switch for key-to-test function.
 2. Oiltight green ON pilot light.
 3. Isolated neutral lug; 200 percent rating.
 4. Mechanically interlocked auxiliary contacts that change state when switch is opened and closed.
 5. Form C alarm contacts that change state when switch is tripped.
 6. Three-pole, double-throw, fire-safety and alarm relay; 120-V ac coil voltage.
 7. Three-pole, double-throw, fire-alarm voltage monitoring relay complying with NFPA 72.

2.5 MOLDED-CASE CIRCUIT BREAKERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- B. **Basis-of-Design Product:** Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 1. [Eaton Electrical Inc.; Cutler-Hammer Business Unit.](#)
 2. [General Electric Company; GE Consumer & Industrial - Electrical Distribution.](#)
 3. [Siemens Energy & Automation, Inc.](#)
 4. [Square D; a brand of Schneider Electric.](#)
- C. General Requirements: Comply with UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents.
- D. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.

- E. Adjustable, Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
- F. Electronic Trip Circuit Breakers: Field-replaceable rating plug, rms sensing, with the following field-adjustable settings:
 - 1. Instantaneous trip.
 - 2. Long- and short-time pickup levels.
 - 3. Long- and short-time time adjustments.
 - 4. Ground-fault pickup level, time delay, and I^2t response.
- G. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller, and let-through ratings less than NEMA FU 1, RK-5.
- H. Integrally Fused Circuit Breakers: Thermal-magnetic trip element with integral limiter-style fuse listed for use with circuit breaker and trip activation on fuse opening or on opening of fuse compartment door.
- I. Ground-Fault, Circuit-Interrupter (GFCI) Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (6-mA trip).
- J. Ground-Fault, Equipment-Protection (GFEP) Circuit Breakers: With Class B ground-fault protection (30-mA trip).
- K. Features and Accessories:
 - 1. Standard frame sizes, trip ratings, and number of poles.
 - 2. Lugs: Compression type, suitable for number, size, trip ratings, and conductor material.
 - 3. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge lighting circuits.
 - 4. Ground-Fault Protection: Comply with UL 1053; integrally mounted, self-powered type with mechanical ground-fault indicator; relay with adjustable pickup and time-delay settings, push-to-test feature, internal memory, and shunt trip unit; and three-phase, zero-sequence current transformer/sensor.
 - 5. Communication Capability: Universal-mounted communication module with functions and features compatible with power monitoring and control system, specified in Section 260913 "Electrical Power Monitoring and Control."
 - 6. Shunt Trip: Trip coil energized from separate circuit, with coil-clearing contact.
 - 7. Undervoltage Trip: Set to operate at 35 to 75 percent of rated voltage without intentional time delay.
 - 8. Auxiliary Contacts: Two SPDT switches with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts, "b" contacts operate in reverse of circuit-breaker contacts.
 - 9. Alarm Switch: One NO contact that operates only when circuit breaker has tripped.
 - 10. Key Interlock Kit: Externally mounted to prohibit circuit-breaker operation; key shall be removable only when circuit breaker is in off position.
 - 11. Zone-Selective Interlocking: Integral with ground-fault trip unit; for interlocking ground-fault protection function.
 - 12. Electrical Operator: Provide remote control for on, off, and reset operations.

2.6 MOLDED-CASE SWITCHES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- B. **Basis-of-Design Product:** Subject to compliance with requirements, provide product indicated on Drawings comparable product by one of the following:
1. [Eaton Electrical Inc.; Cutler-Hammer Business Unit.](#)
 2. [General Electric Company; GE Consumer & Industrial - Electrical Distribution.](#)
 3. [Siemens Energy & Automation, Inc.](#)
 4. [Square D; a brand of Schneider Electric.](#)
- C. General Requirements: MCCB with fixed, high-set instantaneous trip only, and short-circuit withstand rating equal to equivalent breaker frame size interrupting rating.
- D. Features and Accessories:
1. Standard frame sizes and number of poles.
 2. Lugs: Mechanical type, suitable for number, size, trip ratings, and conductor material.
 3. Ground-Fault Protection: Comply with UL 1053; remote-mounted and powered type with mechanical ground-fault indicator; relay with adjustable pickup and time-delay settings, push-to-test feature, internal memory, and shunt trip unit; and three-phase, zero-sequence current transformer/sensor.
 4. Shunt Trip: Trip coil energized from separate circuit, with coil-clearing contact.
 5. Undervoltage Trip: Set to operate at 35 to 75 percent of rated voltage without intentional time delay.
 6. Auxiliary Contacts: Two SPDT switches with "a" and "b" contacts; "a" contacts mimic switch contacts, "b" contacts operate in reverse of switch contacts.
 7. Alarm Switch: One NO contact that operates only when switch has tripped.
 8. Key Interlock Kit: Externally mounted to prohibit switch operation; key shall be removable only when switch is in off position.
 9. Zone-Selective Interlocking: Integral with ground-fault shunt trip unit; for interlocking ground-fault protection function.
 10. Electrical Operator: Provide remote control for on, off, and reset operations.

2.7 ENCLOSURES

- A. Enclosed Switches and Circuit Breakers: NEMA AB 1, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.
1. Indoor, Dry and Clean Locations: NEMA 250, Type 1
 2. Outdoor Locations: NEMA 250, Type 3R.
 3. Kitchen Areas: NEMA 250, Type 4X, stainless steel.
 4. Other Wet or Damp, Indoor Locations: NEMA 250, Type 4.
 5. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 12.
 6. Hazardous Areas Indicated on Drawings: NEMA 250, Type 9.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.
- B. Comply with mounting and anchoring requirements specified in Section 260548 "Vibration and Seismic Controls for Electrical Systems."
- C. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.
- D. Install fuses in fusible devices.
- E. Comply with NECA 1.

3.3 IDENTIFICATION

- A. Comply with requirements in Section 260553 "Identification for Electrical Systems."
 - 1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
 - 2. Label each enclosure with engraved metal or laminated-plastic nameplate.

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.
- C. Perform tests and inspections.
 - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- D. Acceptance Testing Preparation:
 - 1. Test insulation resistance for each enclosed switch and circuit breaker, component, connecting supply, feeder, and control circuit.
 - 2. Test continuity of each circuit.
- E. Tests and Inspections:
 - 1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 - 2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
 - 3. Perform the following infrared scan tests and inspections and prepare reports:
 - a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each enclosed switch and

- circuit breaker. Remove front panels so joints and connections are accessible to portable scanner.
 - b. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each enclosed switch and circuit breaker 11 months after date of Substantial Completion.
 - c. Instruments and Equipment: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
- 4. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.
- F. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.
- G. Prepare test and inspection reports, including a certified report that identifies enclosed switches and circuit breakers and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.5 ADJUSTING

- A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.

END OF SECTION 262816

SECTION 262913

ENCLOSED CONTROLLERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes the following enclosed controllers rated 600 V and less:
 - 1. Full-voltage manual.
 - 2. Full-voltage magnetic.
 - 3. Reduced-voltage magnetic.
 - 4. Reduced-voltage solid state.
 - 5. Multispeed.
- B. Related Section:
 - 1. Section 262923 "Variable-Frequency Motor Controllers" for general-purpose, ac, adjustable-frequency, pulse-width-modulated controllers for use on variable torque loads in ranges up to 200 hp.

1.3 DEFINITIONS

- A. CPT: Control power transformer.
- B. MCCB: Molded-case circuit breaker.
- C. MCP: Motor circuit protector.
- D. N.C.: Normally closed.
- E. N.O.: Normally open.
- F. OCPD: Overcurrent protective device.
- G. SCR: Silicon-controlled rectifier.

1.4 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Enclosed controllers shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of enclosed controller. Include manufacturer's technical data on features, performance, electrical characteristics, ratings, and enclosure types and finishes.
- B. Shop Drawings: For each enclosed controller. Include dimensioned plans, elevations, sections, details, and required clearances and service spaces around controller enclosures.
 1. Show tabulations of the following:
 - a. Each installed unit's type and details.
 - b. Factory-installed devices.
 - c. Nameplate legends.
 - d. Short-circuit current rating of integrated unit.
 - e. Listed and labeled for integrated short-circuit current (withstand) rating of OCPDs in combination controllers by an NRTL acceptable to authorities having jurisdiction.
 - f. Features, characteristics, ratings, and factory settings of individual OCPDs in combination controllers.
 2. Wiring Diagrams: For power, signal, and control wiring.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified testing agency.
- B. Seismic Qualification Certificates: For enclosed controllers, accessories, and components, from manufacturer.
 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- C. Field quality-control reports.
- D. Load-Current and Overload-Relay Heater List: Compile after motors have been installed, and arrange to demonstrate that selection of heaters suits actual motor nameplate full-load currents.
- E. Load-Current and List of Settings of Adjustable Overload Relays: Compile after motors have been installed, and arrange to demonstrate that switch settings for motor running overload protection suit actual motors to be protected.

1.7 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For enclosed controllers to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:
1. Routine maintenance requirements for enclosed controllers and installed components.
 2. Manufacturer's written instructions for testing and adjusting circuit breaker and MCP trip settings.
 3. Manufacturer's written instructions for setting field-adjustable overload relays.
 4. Manufacturer's written instructions for testing, adjusting, and reprogramming reduced-voltage solid-state controllers.

1.8 MATERIALS MAINTENANCE SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Fuses for Fused Switches: Equal to 10 percent of quantity installed for each size and type, but no fewer than two of each size and type.
 2. Control Power Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than two of each size and type.
 3. Indicating Lights: Two of each type and color installed.
 4. Auxiliary Contacts: Furnish **one** spare(s) for each size and type of magnetic controller installed.
 5. Power Contacts: Furnish two spares for each size and type of magnetic contactor installed.

1.9 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Member company of NETA or an NRTL.
1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Comply with NFPA 70.
- D. IEEE Compliance: Fabricate and test enclosed controllers according to IEEE 344 to withstand seismic forces defined in Section 260548 "Vibration and Seismic Controls for Electrical Systems."

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Store enclosed controllers indoors in clean, dry space with uniform temperature to prevent condensation. Protect enclosed controllers from exposure to dirt, fumes, water, corrosive substances, and physical damage.

- B. If stored in areas subject to weather, cover enclosed controllers to protect them from weather, dirt, dust, corrosive substances, and physical damage. Remove loose packing and flammable materials from inside controllers; install temporary electric heating, with at least 250 W per controller.

1.11 PROJECT CONDITIONS

- A. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:
 - 1. Ambient Temperature: Not less than minus 22 deg F (minus 30 deg C) and not exceeding 104 deg F (40 deg C).
 - 2. Altitude: Not exceeding 6600 feet (2010 m).
- B. Interruption of Existing Electrical Systems: Do not interrupt electrical systems in facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electrical service according to requirements indicated:
 - 1. Notify Architect, Construction Manager and Owner no fewer than two days in advance of proposed interruption of electrical systems.
 - 2. Indicate method of providing temporary utilities.
 - 3. Do not proceed with interruption of electrical systems without Architect's and Owner's written permission.
 - 4. Comply with NFPA 70E.

1.12 COORDINATION

- A. Coordinate layout and installation of enclosed controllers with other construction including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
- B. Coordinate sizes and locations of concrete bases with actual equipment provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified with concrete.
- C. Coordinate installation of roof curbs, equipment supports, and roof penetrations.

PART 2 - PRODUCTS

2.1 FULL-VOLTAGE CONTROLLERS

- A. General Requirements for Full-Voltage Controllers: Comply with NEMA ICS 2, general purpose, Class A.
- B. Motor-Starting Switches: "Quick-make, quick-break" toggle or push-button action; marked to show whether unit is off or on.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings

3. or comparable product by one of the following:
 - a. [Eaton Electrical Inc.; Cutler-Hammer Business Unit.](#)
 - b. [General Electric Company; GE Consumer & Industrial - Electrical Distribution.](#)
 - c. [Rockwell Automation, Inc.; Allen-Bradley brand.](#)
 - d. [Siemens Energy & Automation, Inc.](#)
 - e. [Square D; a brand of Schneider Electric.](#)
 4. Configuration: Nonreversing.
 5. **Flush** mounting.
 6. **Green** pilot light.
 7. Additional Nameplates: HIGH and LOW for two-speed switches.
- C. Fractional Horsepower Manual Controllers: "Quick-make, quick-break" toggle or push-button action; marked to show whether unit is off, on, or tripped.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 2. **Basis-of-Design Product:** Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. [Eaton Electrical Inc.; Cutler-Hammer Business Unit.](#)
 - b. [General Electric Company; GE Consumer & Industrial - Electrical Distribution.](#)
 - c. [Rockwell Automation, Inc.; Allen-Bradley brand.](#)
 - d. [Siemens Energy & Automation, Inc.](#)
 - e. [Square D; a brand of Schneider Electric.](#)
 3. Configuration: Nonreversing
 4. Overload Relays: Inverse-time-current characteristics; NEMA ICS 2, Class 10 tripping characteristics; heaters matched to nameplate full-load current of actual protected motor; external reset push button; bimetallic type.
 5. Flush mounting.
 6. Green pilot light.
 7. Additional Nameplates: HIGH and LOW for two-speed controllers
- D. Integral Horsepower Manual Controllers: "Quick-make, quick-break" toggle or push-button action; marked to show whether unit is off, on, or tripped.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 2. **Basis-of-Design Product:** Subject to compliance with requirements, provide **product indicated on Drawings** comparable product by one of the following:
 - a. [Eaton Electrical Inc.; Cutler-Hammer Business Unit.](#)
 - b. [General Electric Company; GE Consumer & Industrial - Electrical Distribution.](#)
 - c. [Rockwell Automation, Inc.; Allen-Bradley brand.](#)
 - d. [Siemens Energy & Automation, Inc.](#)
 - e. [Square D; a brand of Schneider Electric.](#)
 3. Configuration: Nonreversing
 4. Overload Relays: Inverse-time-current characteristics; NEMA ICS 2, Class 10 tripping characteristics; heaters and sensors in each phase, matched to nameplate full-load current of actual protected motor and having appropriate adjustment for duty cycle; external reset push button; bimetallic type.

5. **Flush** mounting.
6. **Green** pilot light.
7. Additional Nameplates: FORWARD and REVERSE for reversing controllers
8. auxiliary contact.

2.2 ENCLOSURES

- A. Enclosed Controllers: NEMA ICS 6, to comply with environmental conditions at installed location.
 1. Dry and Clean Indoor Locations: Type 1.
 2. Outdoor Locations: Type 3R.
 3. Wash-Down Areas: Type 4X
 4. Other Wet or Damp Indoor Locations: Type 4 .
 5. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: Type 12.
 6. Hazardous Areas Indicated on Drawings: Type 9.

2.3 ACCESSORIES

- A. General Requirements for Control Circuit and Pilot Devices: NEMA ICS 5; factory installed in controller enclosure cover unless otherwise indicated.
 1. Push Buttons, Pilot Lights, and Selector Switches: Heavy-duty, oiltight type.
 - a. Push Buttons: Covered Lockable Recessed Shielded Shrouded Unguarded types; maintained momentary as indicated.
 - b. Pilot Lights: LED types; colors as indicated[; push to test].
 - c. Selector Switches: Rotary type.
 2. Elapsed Time Meters: Heavy duty with digital readout in hours; resettable.
 3. Meters: Panel type, 2-1/2-inch (64-mm) minimum size with 90- or 120-degree scale and plus or minus two percent accuracy. Where indicated, provide selector switches with an off position.
- B. Reversible N.C./N.O. auxiliary contact(s).
- C. Control Relays: Auxiliary and adjustable solid-state time-delay relays.
- D. Phase-Failure, Phase-Reversal, and Undervoltage and Overvoltage Relays: Solid-state sensing circuit with isolated output contacts for hard-wired connections. Provide adjustable undervoltage, overvoltage, and time-delay settings.
- E. Breather and drain assemblies, to maintain interior pressure and release condensation in Type 4X enclosures installed outdoors or in unconditioned interior spaces subject to humidity and temperature swings.
- F. Space heaters, with N.C. auxiliary contacts, to mitigate condensation in Type 4X Type 12 enclosures installed outdoors or in unconditioned interior spaces subject to humidity and temperature swings.
- G. Sun shields installed on fronts, sides, and tops of enclosures installed outdoors and subject to direct and extended sun exposure.

- H. Cover gaskets for Type 1 enclosures.
- I. Terminals for connecting power factor correction capacitors to the **[line] [load]** side of overload relays.
- J. Spare control wiring terminal blocks, quantity as indicated; wired.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and surfaces to receive enclosed controllers, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
- B. Examine enclosed controllers before installation. Reject enclosed controllers that are wet, moisture damaged, or mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Wall-Mounted Controllers: Install enclosed controllers on walls with tops at uniform height unless otherwise indicated, and by bolting units to wall or mounting on lightweight structural-steel channels bolted to wall. For controllers not at walls, provide freestanding racks complying with Section 260529 "Hangers and Supports for Electrical Systems."
- B. Floor-Mounted Controllers: Install enclosed controllers on **4-inch (100-mm)** nominal-thickness concrete base. Comply with requirements for concrete base specified in **Section 033000 "Cast-in-Place Concrete."**
 - 1. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on **18-inch (450-mm)** centers around the full perimeter of concrete base.
 - 2. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
 - 3. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 4. Install anchor bolts to elevations required for proper attachment to supported equipment.
- C. Seismic Bracing: Comply with requirements specified in Section 260548 "Vibration and Seismic Controls for Electrical Systems."
- D. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.
- E. Install fuses in each fusible-switch enclosed controller.
- F. Install fuses in control circuits if not factory installed. Comply with requirements in Section 262813 "Fuses."
- G. Install heaters in thermal overload relays. Select heaters based on actual nameplate full-load amperes after motors have been installed.

- H. Install, connect, and fuse thermal-protector monitoring relays furnished with motor-driven equipment.
- I. Install power factor correction capacitors. Connect to the line side of overload relays. If connected to the load side of overload relays, adjust overload heater sizes to accommodate the reduced motor full-load currents.
- J. Comply with NECA 1.

3.3 IDENTIFICATION

- A. Identify enclosed controllers, components, and control wiring. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."
 - 1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
 - 2. Label each enclosure with engraved nameplate.
 - 3. Label each enclosure-mounted control and pilot device.

3.4 CONTROL WIRING INSTALLATION

- A. Install wiring between enclosed controllers and remote devices and facility's central control system. Comply with requirements in Section 260523 "Control-Voltage Electrical Power Cables."
- B. Bundle, train, and support wiring in enclosures.
- C. Connect selector switches and other automatic-control selection devices where applicable.
 - 1. Connect selector switches to bypass only those manual- and automatic-control devices that have no safety functions when switch is in manual-control position.
 - 2. Connect selector switches with enclosed-controller circuit in both manual and automatic positions for safety-type control devices such as low- and high-pressure cutouts, high-temperature cutouts, and motor overload protectors.

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.
- C. Perform tests and inspections.
 - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- D. Acceptance Testing Preparation:
 - 1. Test insulation resistance for each enclosed controller, component, connecting supply, feeder, and control circuit.

2. Test continuity of each circuit.

E. Tests and Inspections:

1. Inspect controllers, wiring, components, connections, and equipment installation. Test and adjust controllers, components, and equipment.
2. Test insulation resistance for each enclosed-controller element, component, connecting motor supply, feeder, and control circuits.
3. Test continuity of each circuit.
4. Verify that voltages at controller locations are within plus or minus 10 percent of motor nameplate rated voltages. If outside this range for any motor, notify Architect and Owner before starting the motor(s).
5. Test each motor for proper phase rotation.
6. Perform each electrical test and visual and mechanical inspection stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
7. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
8. Perform the following infrared (thermographic) scan tests and inspections and prepare reports:
 - a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each multi-pole enclosed controller. Remove front panels so joints and connections are accessible to portable scanner.
 - b. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each multi-pole enclosed controller 11 months after date of Substantial Completion.
 - c. Instruments and Equipment: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
9. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.

F. Enclosed controllers will be considered defective if they do not pass tests and inspections.

G. Prepare test and inspection reports including a certified report that identifies enclosed controllers and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.6 ADJUSTING

- A. Set field-adjustable switches, auxiliary relays, time-delay relays, timers, and overload-relay pickup and trip ranges.
- B. Adjust overload-relay heaters or settings if power factor correction capacitors are connected to the load side of the overload relays.
- C. Adjust the trip settings of MCPs and thermal-magnetic circuit breakers with adjustable instantaneous trip elements. Initially adjust to six times the motor nameplate full-load ampere ratings and attempt to start motors several times, allowing for motor cooldown between starts. If tripping occurs on motor inrush, adjust settings in increments until motors start without tripping. Do not exceed eight times the motor full-load amperes (or 11 times for NEMA

Premium Efficient motors if required). Where these maximum settings do not allow starting of a motor, notify Architect and Owner before increasing settings.

- D. Set the taps on reduced-voltage autotransformer controllers at 65 percent.
- E. Set field-adjustable switches and program microprocessors for required start and stop sequences in reduced-voltage solid-state controllers.
- F. Set field-adjustable circuit-breaker trip ranges as specified in Section 260573.16 "Overcurrent Protective Device Coordination Study."

3.7 PROTECTION

- A. Temporary Heating: Apply temporary heat to maintain temperature according to manufacturer's written instructions until enclosed controllers are ready to be energized and placed into service.
- B. Replace controllers whose interiors have been exposed to water or other liquids prior to Substantial Completion.

3.8 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain enclosed controllers, and to use and reprogram microprocessor-based, reduced-voltage solid-state controllers.

END OF SECTION 262913

SECTION 265100
INTERIOR LIGHTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

- 1. Interior lighting fixtures, lamps, and ballasts.
- 2. Emergency lighting units.
- 3. Exit signs.
- 4. Lighting fixture supports.
- 5. Retrofit kits for fluorescent lighting fixtures.

- B. Related Sections:

- 1. Section 260923 "Lighting Control Devices" for automatic control of lighting, including time switches, photoelectric relays, occupancy sensors, and multipole lighting relays and contactors.
- 2. Section 260933 "Central Dimming Controls" Section 260936 "Modular Dimming Controls" for architectural dimming systems.
- 3. Section 260943.13 "Addressable-Fixture Lighting Controls" and Section 260943.23 "Relay-Based Lighting Controls" for manual or programmable control systems with low-voltage control wiring or data communication circuits.
- 4. Section 262726 "Wiring Devices" for manual wall-box dimmers for incandescent lamps.
- 5. Section 265561 "Theatrical Lighting" for theatrical lighting fixtures and their controls.

1.3 DEFINITIONS

- A. BF: Ballast factor.
- B. CCT: Correlated color temperature.
- C. CRI: Color-rendering index.
- D. HID: High-intensity discharge.
- E. LER: Luminaire efficacy rating.
- F. Lumen: Measured output of lamp and luminaire, or both.
- G. Luminaire: Complete lighting fixture, including ballast housing if provided.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of lighting fixture, arranged in order of fixture designation. Include data on features, accessories, finishes, and the following:
1. Physical description of lighting fixture including dimensions.
 2. Emergency lighting units including battery and charger.
 3. Ballast, including BF.
 4. Energy-efficiency data.
 5. Air and Thermal Performance Data: For air-handling lighting fixtures. Furnish data required in "Action Submittals" Article in Section 233713 "Diffusers, Registers, and Grilles."
 6. Sound Performance Data: For air-handling lighting fixtures. Indicate sound power level and sound transmission class in test reports certified according to standards specified in Section 233713 "Diffusers, Registers, and Grilles."
 7. Life, output (lumens, CCT, and CRI), and energy-efficiency data for lamps.
 8. Photometric data and adjustment factors based on laboratory tests, complying with IESNA Lighting Measurements Testing & Calculation Guides, of each lighting fixture type. The adjustment factors shall be for lamps, ballasts, and accessories identical to those indicated for the lighting fixture as applied in this Project.
 - a. Testing Agency Certified Data: For indicated fixtures, photometric data shall be certified by a qualified independent testing agency. Photometric data for remaining fixtures shall be certified by manufacturer.
 - b. Manufacturer Certified Data: Photometric data shall be certified by a manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products.
- B. Shop Drawings: For nonstandard or custom lighting fixtures. Include plans, elevations, sections, details, and attachments to other work.
1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 2. Wiring Diagrams: For power, signal, and control wiring.
- C. Samples: For each lighting fixture indicated in the Interior Lighting Fixture Schedule. Each Sample shall include the following:
1. Lamps and ballasts, installed.
 2. Cords and plugs.
 3. Pendant support system.
- D. Installation instructions.

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plan(s) and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
1. Lighting fixtures.
 2. Suspended ceiling components.

3. Partitions and millwork that penetrate the ceiling or extends to within 12 inches (305 mm) of the plane of the luminaires.
 4. Ceiling-mounted projectors.
 5. Structural members to which suspension systems for lighting fixtures will be attached.
 6. Other items in finished ceiling including the following:
 - a. Air outlets and inlets.
 - b. Speakers.
 - c. Sprinklers.
 - d. Smoke and fire detectors.
 - e. Occupancy sensors.
 - f. Access panels.
 - g. <Insert item>.
 7. Perimeter moldings.
- B. Qualification Data: For qualified agencies providing photometric data for lighting fixtures.
- C. Product Certificates: For each type of ballast for bi-level and dimmer-controlled fixtures, from manufacturer.
- D. Field quality-control reports.
- E. Warranty: Sample of special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For lighting equipment and fixtures to include in emergency, operation, and maintenance manuals.
1. Provide a list of all lamp types used on Project; use ANSI and manufacturers' codes.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Lamps: 10 for every 100 Insert quantity of each type and rating installed. Furnish at least one of each type.
 2. Plastic Diffusers and Lenses: One for every 100 Insert quantity of each type and rating installed. Furnish at least one of each type.
 3. Fluorescent-fixture-mounted, emergency battery pack: One for every 50 emergency lighting unit.
 4. Ballasts: One for every 100 of each type and rating installed. Furnish at least one of each type.
 5. Globes and Guards: One for every 20 of each type and rating installed. Furnish at least one of each type.

1.8 QUALITY ASSURANCE

- A. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by manufacturers' laboratories that are accredited under the National Volunteer Laboratory Accreditation Program for Energy Efficient Lighting Products.
- B. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by an independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910, complying with the IESNA Lighting Measurements Testing & Calculation Guides.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- D. Comply with NFPA 70.
- E. FM Global Compliance: Lighting fixtures for hazardous locations shall be listed and labeled for indicated class and division of hazard by FM Global.
- F. Mockups: Provide interior lighting fixtures for room or module mockups, complete with power and control connections.
 - 1. Obtain Architect's approval of fixtures for mockups before starting installations.
 - 2. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 - 3. Approved fixtures in mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 COORDINATION

- A. Coordinate layout and installation of lighting fixtures and suspension system with other construction that penetrates ceilings or is supported by them, including HVAC equipment, fire-suppression system, and partition assemblies.

1.10 WARRANTY

- A. Special Warranty for Emergency Lighting Batteries: Manufacturer's standard form in which manufacturer of battery-powered emergency lighting unit agrees to repair or replace components of rechargeable batteries that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period for Emergency Lighting Unit Batteries: 10 Insert number years from date of Substantial Completion. Full warranty shall apply for first year, and prorated warranty for the remaining nine years.
 - 2. Warranty Period for Emergency Fluorescent Ballast and Self-Powered Exit Sign Batteries: Seven years from date of Substantial Completion. Full warranty shall apply for first year, and prorated warranty for the remaining six years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide one of the products indicated on Drawings.

2.2 GENERAL REQUIREMENTS FOR LIGHTING FIXTURES AND COMPONENTS

- A. Recessed Fixtures: Comply with NEMA LE 4 for ceiling compatibility for recessed fixtures.
- B. Incandescent Fixtures: Comply with UL 1598. Where LER is specified, test according to NEMA LE 5A.
- C. Fluorescent Fixtures: Comply with UL 1598. Where LER is specified, test according to NEMA LE 5 and NEMA LE 5A as applicable.
- D. HID Fixtures: Comply with UL 1598. Where LER is specified, test according to NEMA LE 5B.
- E. Metal Parts: Free of burrs and sharp corners and edges.
- F. Sheet Metal Components: Steel unless otherwise indicated. Form and support to prevent warping and sagging.
- G. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.
- H. Diffusers and Globes:
 - 1. Acrylic Lighting Diffusers: 100 percent virgin acrylic plastic. High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
 - a. Lens Thickness: At least **0.125 inch (3.175 mm)** minimum unless otherwise indicated.
 - b. UV stabilized.
 - 2. Glass: Annealed crystal glass unless otherwise indicated.
- I. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps and ballasts. Labels shall be located where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.
 - 1. Label shall include the following lamp and ballast characteristics:
 - a. "USE ONLY" and include specific lamp type.
 - b. Lamp diameter code (T-4, T-5, T-8, T-12, etc.), tube configuration (twin, quad, triple, etc.), base type, and nominal wattage for fluorescent and compact fluorescent luminaires.
 - c. Lamp type, wattage, bulb type (ED17, BD56, etc.) and coating (clear or coated) for HID luminaires.

- d. Start type (preheat, rapid start, instant start, etc.) for fluorescent and compact fluorescent luminaires.
 - e. ANSI ballast type (M98, M57, etc.) for HID luminaires.
 - f. CCT and CRI for all luminaires.
- J. Electromagnetic-Interference Filters: Factory installed to suppress conducted electromagnetic interference as required by MIL-STD-461E. Fabricate lighting fixtures with one filter on each ballast indicated to require a filter.
- K. Air-Handling Fluorescent Fixtures: For use with plenum ceiling for air return and heat extraction and for attaching an air-diffuser-boot assembly specified in Section 233713 "Diffusers, Registers, and Grilles."
- 1. Air-Supply Units: Slots in one or both side trims join with air-diffuser-boot assemblies.
 - 2. Heat-Removal Units: Air path leads through lamp cavity.
 - 3. Combination Heat-Removal and Air-Supply Unit: Heat is removed through lamp cavity at both ends of the fixture door with air supply same as for air-supply units.
 - 4. Dampers: Operable from outside fixture for control of return-air volume.
 - 5. Static Fixture: Air-supply slots are blanked off, and fixture appearance matches active units.

2.3 BALLASTS FOR HID LAMPS

- A. Electromagnetic Ballast for Metal-Halide Lamps: Comply with ANSI C82.4 and UL 1029. Include the following features unless otherwise indicated:
- 1. Ballast Circuit: Constant-wattage autotransformer or regulating high-power-factor type.
 - 2. Minimum Starting Temperature: **Minus 22 deg F (Minus 30 deg C)** for single-lamp ballasts.
 - 3. Rated Ambient Operating Temperature: **104 deg F (40 deg C)**.
 - 4. Open-circuit operation that will not reduce average life.
 - 5. Low-Noise Ballasts: Manufacturers' standard epoxy-encapsulated models designed to minimize audible fixture noise.
- B. Electronic Ballast for Metal-Halide Lamps: Include the following features unless otherwise indicated:
- 1. Minimum Starting Temperature: **Minus 20 deg F (Minus 29 deg C)** for single-lamp ballasts.
 - 2. Rated Ambient Operating Temperature: **130 deg F (54 deg C)**.
 - 3. Lamp end-of-life detection and shutdown circuit.
 - 4. Sound Rating: Class A.
 - 5. Total Harmonic Distortion Rating: Less than 20 percent.
 - 6. Transient Voltage Protection: IEEE C62.41.1 and IEEE C62.41.2, Category A or better.
 - 7. Lamp Current Crest Factor: 1.5 or less.
 - 8. Power Factor: 0.90 or higher.
 - 9. Interference: Comply with 47 CFR 18, Ch. 1, Subpart C, for limitations on electromagnetic and radio-frequency interference for nonconsumer equipment.
 - 10. Protection: Class P thermal cutout.
 - 11. Bi-Level Dimming Ballast: Ballast circuit and leads provide for remote control of the light output of the associated fixture between high- and low-level and off.
 - a. High-Level Operation: 100 percent of rated lamp lumens.
 - b. Low-Level Operation: 50 percent of rated lamp lumens.

- c. Compatibility: Certified by ballast manufacturer for use with specific bi-level control system and lamp type indicated. Certified by lamp manufacturer that ballast operating modes are free from negative effect on lamp life and color-rendering capability.
12. Continuous Dimming Ballast: Dimming range shall be from 100 to 35 percent of rated lamp lumens without flicker.
- a. Ballast Input Watts: Reduced to a maximum of **[50]** <Insert number> percent of normal at lowest dimming setting.
- C. High-Pressure Sodium Ballasts: Electromagnetic type, with solid-state igniter/starter. Igniter/starter shall have an average life in pulsing mode of 10,000 hours at an igniter/starter-case temperature of 90 deg C.
- 1. Instant-Restrike Device: Integral with ballast, or solid-state potted module, factory installed within fixture and compatible with lamps, ballasts, and mogul sockets up to 150 W.
 - 2. Minimum Starting Temperature: **Minus 40 deg F (Minus 40 deg C).**

2.4 QUARTZ LAMP LIGHTING CONTROLLER

- A. General Requirements for Controllers: Factory installed by lighting fixture manufacturer. Comply with UL 1598.
- B. Standby (Quartz Restrike): Automatically switches quartz lamp on when a HID lamp in the fixture is initially energized and during the HID lamp restrike period after brief power outages.
- C. Connections: Designed for a single branch -circuit connection.
- D. Switching Off: Automatically switches quartz lamp off when HID lamp strikes.
- E. Switching Off: Automatically switches quartz lamp off when HID lamp reaches approximately 60 percent light output.

2.5 EXIT SIGNS

- A. General Requirements for Exit Signs: Comply with UL 924; for sign colors, visibility, luminance, and lettering size, comply with authorities having jurisdiction.
- B. Internally Lighted Signs:
 - 1. Lamps for AC Operation: Fluorescent, two for each fixture, 20,000 hours of rated lamp life.
 - 2. Lamps for AC Operation: LEDs, 50,000 hours minimum rated lamp life.
 - 3. Self-Powered Exit Signs (Battery Type): Integral automatic charger in a self-contained power pack.
 - a. Battery: Sealed, maintenance-free, nickel-cadmium type.
 - b. Charger: Fully automatic, solid-state type with sealed transfer relay.
 - c. Operation: Relay automatically energizes lamp from battery when circuit voltage drops to 80 percent of nominal voltage or below. When normal voltage is restored,

9. Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and a flashing red LED.

2.7 HID LAMPS

- A. High-Pressure Sodium Lamps: ANSI C78.42, CRI 21 (minimum), color temperature 1900 K, and average rated life of 24,000 hours, minimum.
 1. Dual-Arc Tube Lamps: Arranged so only one of two arc tubes is lighted at one time and, when power is restored after an outage, the cooler arc tube, with lower internal pressure, lights instantly, providing an immediate 8 to 15 percent of normal light output.
- B. Metal-Halide Lamps: ANSI C78.43, with minimum CRI 65, and color temperature 4000K.
- C. Pulse-Start, Metal-Halide Lamps: Minimum CRI 65, and color temperature 4000 K.
- D. Ceramic, Pulse-Start, Metal-Halide Lamps: Minimum CRI 80, and color temperature 4000K.
- E. Low-Pressure Sodium Lamps: ANSI 78.41, CRI 0, and color temperature 1800 K.

2.8 LIGHTING FIXTURE SUPPORT COMPONENTS

- A. Comply with Section 260529 "Hangers and Supports for Electrical Systems" for channel- and angle-iron supports and nonmetallic channel and angle supports.
- B. Single-Stem Hangers: **1/2-inch (13-mm)** steel tubing with swivel ball fittings and ceiling canopy. Finish same as fixture.
- C. Twin-Stem Hangers: Two, **1/2-inch (13-mm)** steel tubes with single canopy designed to mount a single fixture. Finish same as fixture.
- D. Wires: ASTM A 641/A 641M, Class 3, soft temper, zinc-coated steel, **12 gage (2.68 mm)**.
- E. Wires for Humid Spaces: ASTM A 580/A 580M, Composition 302 or 304, annealed stainless steel, **12 gage (2.68 mm)**
- F. Rod Hangers: **3/16-inch (5-mm)** minimum diameter, cadmium-plated, threaded steel rod.
- G. Hook Hangers: Integrated assembly matched to fixture and line voltage and equipped with threaded attachment, cord, and locking-type plug.

2.9 RETROFIT KITS FOR FLUORESCENT LIGHTING FIXTURES

- A. Reflector Kit: UL 1598, Type I. Suitable for two- to four-lamp, surface-mounted or recessed lighting fixtures by improving reflectivity of fixture surfaces.
- B. Ballast and Lamp Change Kit: UL 1598, Type II. Suitable for changing existing ballast, lamps, and sockets.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Lighting fixtures:
 - 1. Set level, plumb, and square with ceilings and walls unless otherwise indicated.
 - 2. Install lamps in each luminaire.
- B. Temporary Lighting: If it is necessary, and approved by Architect, to use permanent luminaires for temporary lighting, install and energize the minimum number of luminaires necessary. When construction is sufficiently complete, remove the temporary luminaires, disassemble, clean thoroughly, install new lamps, and reinstall.
- C. Remote Mounting of Ballasts: Distance between the ballast and fixture shall not exceed that recommended by ballast manufacturer. Verify, with ballast manufacturers, maximum distance between ballast and luminaire.
- D. Lay-in Ceiling Lighting Fixtures Supports: Use grid as a support element.
 - 1. Install ceiling support system rods or wires, independent of the ceiling suspension devices, for each fixture. Locate not more than **6 inches (150 mm)** from lighting fixture corners.
 - 2. Support Clips: Fasten to lighting fixtures and to ceiling grid members at or near each fixture corner with clips that are UL listed for the application.
 - 3. Fixtures of Sizes Less Than Ceiling Grid: Install as indicated on reflected ceiling plans or center in acoustical panel, and support fixtures independently with at least two **3/4-inch (20-mm)** metal channels spanning and secured to ceiling tees.
 - 4. Install at least one independent support rod or wire from structure to a tab on lighting fixture. Wire or rod shall have breaking strength of the weight of fixture at a safety factor of 3.
- E. Suspended Lighting Fixture Support:
 - 1. Pendants and Rods: Where longer than **48 inches (1200 mm)**, brace to limit swinging.
 - 2. Stem-Mounted, Single-Unit Fixtures: Suspend with twin-stem hangers.
 - 3. Continuous Rows: Use tubing or stem for wiring at one point and tubing or rod for suspension for each unit length of fixture chassis, including one at each end.
 - 4. Do not use grid as support for pendant luminaires. Connect support wires or rods to building structure.
- F. Air-Handling Lighting Fixtures: Install with dampers closed and ready for adjustment.
- G. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

3.2 IDENTIFICATION

- A. Install labels with panel and circuit numbers on concealed junction and outlet boxes. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.3 FIELD QUALITY CONTROL

- A. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery and retransfer to normal.
- B. Verify that self-luminous exit signs are installed according to their listing and the requirements in NFPA 101.
- C. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

3.4 STARTUP SERVICE

- A. Burn-in all lamps that require specific aging period to operate properly, prior to occupancy by Owner. Burn-in fluorescent and compact fluorescent lamps intended to be dimmed, for at least 100 hours at full voltage.

3.5 ADJUSTING

- A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting aimable luminaires to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose. Some of this work may be required after dark.
 - 1. Adjust aimable luminaires in the presence of Architect.

END OF SECTION 265100

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