



WASHINGTON ACADEMY

PUBLIC WATER SYSTEM CONSOLIDATION

**66 CUTLER ROAD
EAST MACHIAS, MAINE**

PREPARED BY:



**36 Penn Plaza
Bangor, ME 04401
(207) 573-4130**

ISSUED FOR BID

January, 2025

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GEOTECHNICAL REPORT - Explorations and Geotechnical Engineering Services, Proposed Water System Consolidation, Washington Academy, 66 Cutler Road, East Machias, Maine

ADVERTISEMENT FOR BIDS
WASHINGTON ACADEMY
EAST MACHIAS, MAINE
PUBLIC WATER SYSTEM CONSOLIDATION

General Notice

Washington Academy (Owner) is requesting Bids for the construction of the following Project:

Public Water System Consolidation (229946)

Bids for the construction of the Project will be received at Washington Academy, 66 Cutler Road, East Machias, ME 04630, until Thursday, February 6, 2025 at 2:00 pm local time. At that time the Bids received will be publicly opened at DuBois & King located at 36 Penn Plaza, Bangor, Maine on Thursday, February 6, 2025 2:00 pm local time, and read in the conference area.

The Project includes the following Work:

Construction of a new water treatment building, water treatment equipment, and water supply and distribution infrastructure.

Bids are requested for the following Contract: Washington Academy Public Water System Consolidation

Owner expects that the Project's construction schedule will be completed no later than by Monday, September 1, 2025.

Each BID must be accompanied by a certified check payable to the OWNER for five percent (5%) of the total amount of the BID. A BID BOND may be used in lieu of a certified check.

The CONTRACT DOCUMENTS may be examined at the following locations:

https://www.dubois-king.com/projects-bidding-active/	DuBois & King, Inc. 28 North Main Street Randolph, Vermont 05060
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ISSUING OFFICE:

The Issuing Office for the Bidding Documents is: DuBois & King, Inc., 28 North Main Street, P.O. Box 339, Randolph, VT 05060, Contact: Donna Johnson at 802-728-3376, djohnson@dubois-king.com. Bidding Documents may be obtained via one of the following methods:

1. Via Download Electronic Copy: Download Bid Documents as a pdf at www.dubois-king.com/projects-bidding-active/ for a non-refundable charge of \$50.00.

Note: When purchasing download bid documents, the purchaser will receive an e-mail notification with a link to the downloadable plans and specifications. Depending on individual computer settings, the e-mail may go to the spam folder. Please check the spam folder and allow e-mails from dubois-king.com

2. If Hard Copies are wanted: Please contact the Issuing Office Contact identified above to discuss the details of this method and to confirm cost.

The date that the Bidding Documents are transmitted by the Issuing Office will be considered the prospective Bidder's date of receipt of the Bidding Documents. Partial sets of Bidding Documents will not be available from the Issuing Office. Only Bid Documents obtained from DuBois & King, Inc. (Website or Issuing Office) shall be used for submitting a Bid. Neither Owner nor Engineer will be responsible for full or partial sets of Bidding Documents, including Addenda if any, obtained from sources other than the Issuing Office.

IMPORTANT

Any change to the Bidding Documents during the bid period will be made via addenda and posted at www.dubois-king.com/projects-bidding-active. The prospective Bidder is responsible for checking the web site as required to obtain any/all addenda that may be issued. The Issuing Office is NOT responsible for notifying prospective Bidders when addenda are posted. This responsibility lies with the prospective Bidder.

Any CONTRACT or CONTRACTS awarded under this Invitation for BIDS are expected to be funded in part by a grant from the United States Environmental Protection Agency. Neither the United States nor any of its departments, agencies or employees are or will be a part to the Invitation for BIDS or any resulting contract. This contract is subject to all applicable and/or relevant Federal procurement guidelines pertaining to Grants and Cooperative Agreements with State and Local Governments.

A pre-bid walkthrough for the Project will be held on Tuesday, January 21, 2025 at 10:00AM at Washington Academy, 66 Cutler Rd, East Machias, ME 04630. Attendance is encouraged but not required.

All questions pertaining to this Advertisement for Bid should be submitted to Jeff Aceto, P.E., via email at jaceto@dubois-king.com no later than January 28, 2025 at 5:00 pm.

Instructions to Bidders.

For all further requirements regarding bid submittal, qualifications, procedures, and contract award, refer to the Instructions to Bidders that are included in the Bidding Documents.

American Iron and Steel

Section 746 of Title VII of the Consolidated Appropriations Act of 2017 (Division A - Agriculture, Rural Development, Food and Drug Administration, and Related Agencies Appropriations Act, 2017) and subsequent statutes mandating domestic preference applies an American Iron and Steel requirement to this project. All iron and steel products used in this project must be produced in the United States. The term "iron and steel products" means the following products made primarily of iron or steel: lined or unlined pipes and fittings, manhole covers and other municipal castings, hydrants, tanks, flanges, pipe clamps and restraints, valves, structural steel, reinforced precast concrete, and Construction Materials.

This project is funded in part through the Maine Drinking Water State Revolving Fund. Consequently, the following provisions apply to this WORK (more detail for each of these provisions can be found in Instruction to Bidders):

1. Bid security in accordance with the Instructions to Bidders
2. Disadvantaged Business Enterprise (DBE) requirements
3. Performance BOND and Payment BOND each in the amount of 100% of the contract price
4. 'AIS" (American Iron and Steel) provisions of P.L. 113-76, Consolidated Appropriations Act

5. Federal Wage Rates as determined under the Davis-Bacon Act
6. Prohibition on Certain Telecommunications and Video Surveillance Services or Equipment

This Advertisement is issued by:

Owner: Washington Academy

By: Jud McBrine

Title: Head of School

Date: January 7, 2025

INSTRUCTIONS TO BIDDERS FOR CONSTRUCTION CONTRACT

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ARTICLE 1—DEFINED TERMS

- 1.01 Terms used in these Instructions to Bidders have the meanings indicated in the General Conditions and Supplementary Conditions. Additional terms used in these Instructions to Bidders have the meanings indicated below:
- A. *Issuing Office*—The office from which the Bidding Documents are to be issued, and which registers plan holders.

ARTICLE 2—BIDDING DOCUMENTS

- 2.01 Bidder shall obtain a complete set of Bidding Requirements and proposed Contract Documents (together, the Bidding Documents). See the Agreement for a list of the Contract Documents. It is Bidder's responsibility to determine that it is using a complete set of documents in the preparation of a Bid. Bidder assumes sole responsibility for errors or misinterpretations resulting from the use of incomplete documents, by Bidder itself or by its prospective Subcontractors and Suppliers.
- 2.02 Bidding Documents are made available for the sole purpose of obtaining Bids for completion of the Project and permission to download or distribution of the Bidding Documents does not confer a license or grant permission or authorization for any other use. Authorization to download documents, or other distribution, includes the right for plan holders to print documents solely for their use, and the use of their prospective Subcontractors and Suppliers, provided the plan holder pays all costs associated with printing or reproduction. Printed documents may not be re-sold under any circumstances.
- 2.03 Owner has established a Bidding Documents Website as indicated in the Advertisement or invitation to bid. Owner recommends that Bidder register as a plan holder with the Issuing Office at such website, and obtain a complete set of the Bidding Documents from such website. Bidders may rely that sets of Bidding Documents obtained from the Bidding Documents Website are complete, unless an omission is blatant. Registered plan holders will receive Addenda issued by Owner.
- 2.04 Plan rooms (including construction information subscription services, and electronic and virtual plan rooms) may distribute the Bidding Documents, or make them available for examination. Those prospective bidders that obtain an electronic (digital) copy of the Bidding Documents from a plan room are encouraged to register as plan holders from the Bidding Documents Website or Issuing Office. Owner is not responsible for omissions in Bidding Documents or other documents obtained from plan rooms, or for a Bidder's failure to obtain Addenda from a plan room.
- 2.05 *Electronic Documents*
- A. When the Bidding Requirements indicate that electronic (digital) copies of the Bidding Documents are available, such documents will be made available to the Bidders as Electronic Documents in the manner specified.

1. Bidding Documents will be provided in Adobe PDF (Portable Document Format) (.pdf) that is readable by Adobe Acrobat Reader. It is the intent of the Engineer and Owner that such Electronic Documents are to be exactly representative of the paper copies of the documents. However, because the Owner and Engineer cannot totally control the transmission and receipt of Electronic Documents nor the Contractor's means of reproduction of such documents, the Owner and Engineer cannot and do not guarantee that Electronic Documents and reproductions prepared from those versions are identical in every manner to the paper copies.
- B. Unless otherwise stated in the Bidding Documents, the Bidder may use and rely upon complete sets of Electronic Documents of the Bidding Documents, described in Paragraph 2.06.A above. However, Bidder assumes all risks associated with differences arising from transmission/receipt of Electronic Documents versions of Bidding Documents and reproductions prepared from those versions and, further, assumes all risks, costs, and responsibility associated with use of the Electronic Documents versions to derive information that is not explicitly contained in printed paper versions of the documents, and for Bidder's reliance upon such derived information.

ARTICLE 3—QUALIFICATIONS OF BIDDERS

- 3.01 To demonstrate Bidder's qualifications to perform the Work, after submitting its Bid and within **14** days of Owner's request, Bidder must submit the following information:
 - A. Written evidence establishing its qualifications such as financial data, previous experience, and present commitments.
 - B. A written statement that Bidder is authorized to do business in the state where the Project is located, or a written certification that Bidder will obtain such authority prior to the Effective Date of the Contract.
 - C. Bidder's state or other contractor license number, if applicable.
 - D. Subcontractor and Supplier qualification information.
 - E. Other required information regarding qualifications.
- 3.02 A Bidder's failure to submit required qualification information within the times indicated may disqualify Bidder from receiving an award of the Contract.
- 3.03 No requirement in this Article 3 to submit information will prejudice the right of Owner to seek additional pertinent information regarding Bidder's qualifications.
- 3.04 Manufacturer's Experience: if an equipment manufacturer does not meet the specified period or experience with a product, that equipment can still be considered if the equipment supplier or manufacturer is willing to provide a bond or cash deposit for the duration of specified time period which will guarantee equipment replacement.

ARTICLE 4—PRE-BID CONFERENCE

- 4.01 A non-mandatory pre-bid conference will be held at the time and location indicated in the Advertisement or invitation to bid. Representatives of Owner and Engineer will be present to discuss the Project. Bidders are encouraged to attend and participate in the conference; however, attendance at this conference is not required to submit a Bid.

- 4.02 Information presented at the pre-Bid conference does not alter the Contract Documents. Owner will issue Addenda to make any changes to the Contract Documents that result from discussions at the pre-Bid conference. Information presented, and statements made at the pre-bid conference will not be binding or legally effective unless incorporated in an Addendum.

ARTICLE 5—SITE AND OTHER AREAS; EXISTING SITE CONDITIONS; EXAMINATION OF SITE; OWNER'S SAFETY PROGRAM; OTHER WORK AT THE SITE

5.01 *Site and Other Areas*

- A. The Site is identified in the Bidding Documents. By definition, the Site includes rights-of-way, easements, and other lands furnished by Owner for the use of the Contractor. Any additional lands required for temporary construction facilities, construction equipment, or storage of materials and equipment, and any access needed for such additional lands, are to be obtained and paid for by Contractor.

5.02 *Existing Site Conditions*

A. *Subsurface and Physical Conditions; Hazardous Environmental Conditions*

1. *Geotechnical Baseline Report/Geotechnical Data Report:* The Bidding Documents contain a Geotechnical Baseline Report (GBR) and Geotechnical Data Report (GDR).
 - a. As set forth in the Supplementary Conditions, the GBR describes certain select subsurface conditions that are anticipated to be encountered by Contractor during construction in specified locations ("Baseline Conditions"). The GBR is a Contract Document.
 - b. The Baseline Conditions in the GBR are intended to reduce uncertainty and the degree of contingency in submitted Bids. However, Bidders cannot rely solely on the Baseline Conditions. Bids should be based on a comprehensive approach that includes an independent review and analysis of the GBR, all other Contract Documents, Technical Data, other available information, and observable surface conditions. Not all potential subsurface conditions are baselined.
 - c. Nothing in the GBR is intended to relieve Bidders of the responsibility to make their own determinations regarding construction costs, bidding strategies, and Bid prices, nor of the responsibility to select and be responsible for the means, methods, techniques, sequences, and procedures of construction, and for safety precautions and programs incident thereto.
 - d. As set forth in the Supplementary Conditions, the GDR is a Contract Document containing data prepared by or for the Owner in support of the GBR.

- B. *Underground Facilities:* Underground Facilities are shown or indicated on the Drawings, pursuant to Paragraph 5.05 of the General Conditions, and not in the drawings referred to in Paragraph 5.02.A of these Instructions to Bidders. Information and data regarding the presence or location of Underground Facilities are not intended to be categorized, identified, or defined as Technical Data.

5.03 *Other Site-related Documents*

- A. No other Site-related documents are available.

5.04 *Site Visit and Testing by Bidders*

- A. Bidder is required to visit the Site and conduct a thorough visual examination of the Site and adjacent areas. During the visit the Bidder must not disturb any ongoing operations at the Site.
- B. A Site visit is scheduled following the pre-bid conference. Maps to the Site will be available at the pre-Bid conference.
- C. Bidders visiting the Site are required to arrange their own transportation to the Site.
- D. All access to the Site other than during a regularly scheduled Site visit must be coordinated through the following Owner or Engineer contact for visiting the Site: **Cliff Strout, Director of Facilities, (207) 263-5626**. Bidder must conduct the required Site visit during normal working hours.
- E. Bidder is not required to conduct any subsurface testing, or exhaustive investigations of Site conditions.
- F. On request, and to the extent Owner has control over the Site, and schedule permitting, the Owner will provide Bidder general access to the Site to conduct such additional examinations, investigations, explorations, tests, and studies as Bidder deems necessary for preparing and submitting a successful Bid. Owner will not have any obligation to grant such access if doing so is not practical because of existing operations, security or safety concerns, or restraints on Owner's authority regarding the Site. Bidder is responsible for establishing access needed to reach specific selected test sites.
- G. Bidder must comply with all applicable Laws and Regulations regarding excavation and location of utilities, obtain all permits, and comply with all terms and conditions established by Owner or by property owners or other entities controlling the Site with respect to schedule, access, existing operations, security, liability insurance, and applicable safety programs.
- H. Bidder must fill all holes and clean up and restore the Site to its former condition upon completion of such explorations, investigations, tests, and studies.

5.05 *Owner's Safety Program*

- A. Site visits and work at the Site may be governed by an Owner safety program. If an Owner safety program exists, it will be noted in the Supplementary Conditions.

5.06 *Other Work at the Site*

- A. Reference is made to Article 8 of the Supplementary Conditions for the identification of the general nature of other work of which Owner is aware (if any) that is to be performed at the Site by Owner or others (such as utilities and other prime contractors) and relates to the Work contemplated by these Bidding Documents. If Owner is party to a written contract for such other work, then on request, Owner will provide to each Bidder access to examine such contracts (other than portions thereof related to price and other confidential matters), if any.

ARTICLE 6—BIDDER'S REPRESENTATIONS AND CERTIFICATIONS

6.01 *Express Representations and Certifications in Bid Form, Agreement*

- A. The Bid Form that each Bidder will submit contains express representations regarding the Bidder's examination of Project documentation, Site visit, and preparation of the Bid, and certifications regarding lack of collusion or fraud in connection with the Bid. Bidder should review these representations and certifications, and assure that Bidder can make the representations and certifications in good faith, before executing and submitting its Bid.
- B. If Bidder is awarded the Contract, Bidder (as Contractor) will make similar express representations and certifications when it executes the Agreement.

ARTICLE 7—INTERPRETATIONS AND ADDENDA

- 7.01 Owner on its own initiative may issue Addenda to clarify, correct, supplement, or change the Bidding Documents.
- 7.02 Bidder shall submit all questions about the meaning or intent of the Bidding Documents to Engineer in writing. Contact information and submittal procedures for such questions are as follows:
 - A. Jeffrey Aceto, DuBois & King Inc., 36 Penn Plaza, Bangor, ME 04401, jaceto@dubois-king.com**
- 7.03 Interpretations or clarifications considered necessary by Engineer in response to such questions will be issued by Addenda delivered to all registered plan holders. Questions received less than seven days prior to the date for opening of Bids may not be answered.
- 7.04 Only responses set forth in an Addendum will be binding. Oral and other interpretations or clarifications will be without legal effect. Responses to questions are not part of the Contract Documents unless set forth in an Addendum that expressly modifies or supplements the Contract Documents.

ARTICLE 8—BID SECURITY

- 8.01 A Bid must be accompanied by Bid security made payable to Owner in an amount of 5 percent of Bidder's maximum Bid price (determined by adding the base bid and all alternates) and in the form of a Bid bond issued by a surety meeting the requirements of Paragraph 6.01 of the General Conditions. Such Bid bond will be issued in the form included in the Bidding Documents.
- 8.02 The Bid security of the apparent Successful Bidder will be retained until Owner awards the contract to such Bidder, and such Bidder has executed the Contract, furnished the required Contract security, and met the other conditions of the Notice of Award, whereupon the Bid security will be released. If the Successful Bidder fails to execute and deliver the Contract and furnish the required Contract security within 15 days after the Notice of Award, Owner may consider Bidder to be in default, annul the Notice of Award, and the Bid security of that Bidder will be forfeited, in whole in the case of a penal sum bid bond, and to the extent of Owner's damages in the case of a damages-form bond. Such forfeiture will be Owner's exclusive remedy if Bidder defaults.
- 8.03 The Bid security of other Bidders that Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of 7 days after the Effective Date of the Contract or 60 days after the Bid opening, whereupon Bid security furnished by such Bidders will be released.

- 8.04 Bid security of other Bidders that Owner believes do not have a reasonable chance of receiving the award will be released within 7 days after the Bid opening.

ARTICLE 9—CONTRACT TIMES

- 9.01 The number of days within which, or the dates by which, the Work is to be (a) substantially completed and (b) ready for final payment, and (c) Milestones (if any) are to be achieved, are set forth in the Agreement.
- 9.02 Provisions for liquidated damages, if any, for failure to timely attain a Milestone, Substantial Completion, or completion of the Work in readiness for final payment, are set forth in the Agreement.

ARTICLE 10—SUBSTITUTE AND “OR EQUAL” ITEMS

- 10.01 The Contract for the Work, as awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents without consideration during the bidding and Contract award process of possible substitute or “or-equal” items. In cases in which the Contract allows the Contractor to request that Engineer authorize the use of a substitute or “or-equal” item of material or equipment, application for such acceptance may not be made to and will not be considered by Engineer until after the Effective Date of the Contract.
- 10.02 All prices that Bidder sets forth in its Bid will be based on the presumption that the Contractor will furnish the materials and equipment specified or described in the Bidding Documents, as supplemented by Addenda. Any assumptions regarding the possibility of post-Bid approvals of “or-equal” or substitution requests are made at Bidder’s sole risk.
- 10.03 Any request for substitute or “or equal” shall include the Manufacturer’s Certification of compliance with the Build America, Buy America Act (BABAA) requirements mandated by Title IX of the Infrastructure Investment and Jobs Act (“IIJA”), Pub. L. 177-58.

ARTICLE 11—SUBCONTRACTORS, SUPPLIERS, AND OTHERS

- 11.01 The apparent Successful Bidder, and any other Bidder so requested, must submit to Owner a list of the Subcontractors or Suppliers proposed for the following portions of the Work within five days after Bid opening:
- A. Site, Mechanical, Electrical**
- 11.02 If requested by Owner, such list must be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each such Subcontractor or Supplier. If Owner or Engineer, after due investigation, has reasonable objection to any proposed Subcontractor or Supplier, Owner may, before the Notice of Award is given, request apparent Successful Bidder to submit an acceptable substitute, in which case apparent Successful Bidder will submit a substitute, Bidder’s Bid price will be increased (or decreased) by the difference in cost occasioned by such substitution, and Owner may consider such price adjustment in evaluating Bids and making the Contract award.

- 11.03 If apparent Successful Bidder declines to make any such substitution, Owner may award the Contract to the next lowest Bidder that proposes to use acceptable Subcontractors and Suppliers. Declining to make requested substitutions will constitute grounds for forfeiture of the Bid security of any Bidder. Any Subcontractor or Supplier, so listed and against which Owner or Engineer makes no written objection prior to the giving of the Notice of Award will be deemed acceptable to Owner and Engineer subject to subsequent revocation of such acceptance as provided in Paragraph 7.07 of the General Conditions.

ARTICLE 12—PREPARATION OF BID

- 12.01 The Bid Form is included with the Bidding Documents.
- A. All blanks on the Bid Form must be completed in ink and the Bid Form signed in ink. Erasures or alterations must be initialed in ink by the person signing the Bid Form. A Bid price must be indicated for each section, Bid item, alternate, adjustment unit price item, and unit price item listed therein.
 - B. If the Bid Form expressly indicates that submitting pricing on a specific alternate item is optional, and Bidder elects to not furnish pricing for such optional alternate item, then Bidder may enter the words “No Bid” or “Not Applicable.”
- 12.02 If Bidder has obtained the Bidding Documents as Electronic Documents, then Bidder shall prepare its Bid on a paper copy of the Bid Form printed from the Electronic Documents version of the Bidding Documents. The printed copy of the Bid Form must be clearly legible, printed on 8½ inch by 11-inch paper and as closely identical in appearance to the Electronic Document version of the Bid Form as may be practical. The Owner reserves the right to accept Bid Forms which nominally vary in appearance from the original paper version of the Bid Form, providing that all required information and submittals are included with the Bid.
- 12.03 A Bid by a corporation must be executed in the corporate name by a corporate officer (whose title must appear under the signature), accompanied by evidence of authority to sign. The corporate address and state of incorporation must be shown.
- 12.04 A Bid by a partnership must be executed in the partnership name and signed by a partner (whose title must appear under the signature), accompanied by evidence of authority to sign. The official address of the partnership must be shown.
- 12.05 A Bid by a limited liability company must be executed in the name of the firm by a member or other authorized person and accompanied by evidence of authority to sign. The state of formation of the firm and the official address of the firm must be shown.
- 12.06 A Bid by an individual must show the Bidder’s name and official address.
- 12.07 A Bid by a joint venture must be executed by an authorized representative of each joint venturer in the manner indicated on the Bid Form. The joint venture must have been formally established prior to submittal of a Bid, and the official address of the joint venture must be shown.
- 12.08 All names must be printed in ink below the signatures.
- 12.09 The Bid must contain an acknowledgment of receipt of all Addenda, the numbers of which must be filled in on the Bid Form.
- 12.10 Postal and e-mail addresses and telephone number for communications regarding the Bid must be shown.

- 12.11 The Bid must contain evidence of Bidder's authority to do business in the state where the Project is located, or Bidder must certify in writing that it will obtain such authority within the time for acceptance of Bids and attach such certification to the Bid.
- 12.12 If Bidder is required to be licensed to submit a Bid or perform the Work in the state where the Project is located, the Bid must contain evidence of Bidder's licensure, or Bidder must certify in writing that it will obtain such licensure within the time for acceptance of Bids and attach such certification to the Bid. Bidder's state contractor license number, if any, must also be shown on the Bid Form.

ARTICLE 13—BASIS OF BID

13.01 *Lump Sum*

- A. Bidders must submit a Bid on a lump sum basis as set forth in the Bid Form.

13.02 *Base Bid with Alternates*

- A. Bidders must submit a Bid on a lump sum basis for the base Bid and include a separate price for each alternate described in the Bidding Documents and as provided for in the Bid Form. The price for each alternate will be the amount added to or deleted from the base Bid if Owner selects the alternate.
- B. In the comparison of Bids, alternates will be applied in the same order of priority as listed in the Bid Form.

13.03 *Unit Price*

- A. Bidders must submit a Bid on a unit price basis for each item of Work listed in the unit price section of the Bid Form.
- B. The "Bid Price" (sometimes referred to as the extended price) for each unit price Bid item will be the product of the "Estimated Quantity", which Owner or its representative has set forth in the Bid Form, for the item and the corresponding "Bid Unit Price" offered by the Bidder. The total of all unit price Bid items will be the sum of these "Bid Prices"; such total will be used by Owner for Bid comparison purposes. The final quantities and Contract Price will be determined in accordance with Paragraph 13.03 of the General Conditions.
- C. Discrepancies between the multiplication of units of Work and unit prices will be resolved in favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.

13.04 *Allowances*

- A. For cash allowances the Bid price must include such amounts as the Bidder deems proper for Contractor's overhead, costs, profit, and other expenses on account of cash allowances, if any, named in the Contract Documents, in accordance with Paragraph 13.02.B of the General Conditions.

ARTICLE 14—SUBMITTAL OF BID

- 14.01 The Bidding Documents include one separate unbound copy of the Bid Form, and, if required, the Bid Bond Form. The unbound copy of the Bid Form is to be completed and submitted with the Bid security and the other documents required to be submitted under the terms of Article 2 of the Bid Form.
- 14.02 A Bid must be received no later than the date and time prescribed and at the place indicated in the Advertisement or invitation to bid and must be enclosed in a plainly marked package with the Project title, and, if applicable, the designated portion of the Project for which the Bid is submitted, the name and address of Bidder, and must be accompanied by the Bid security and other required documents. If a Bid is sent by mail or other delivery system, the sealed envelope containing the Bid must be enclosed in a separate package plainly marked on the outside with the notation "BID ENCLOSED." A mailed Bid must be addressed to the location designated in the Advertisement.
- 14.03 Bids received after the date and time prescribed for the opening of bids, or not submitted at the correct location or in the designated manner, will not be accepted and will be returned to the Bidder unopened.

ARTICLE 15—MODIFICATION AND WITHDRAWAL OF BID

- 15.01 An unopened Bid may be withdrawn by an appropriate document duly executed in the same manner that a Bid must be executed and delivered to the place where Bids are to be submitted prior to the date and time for the opening of Bids. Upon receipt of such notice, the unopened Bid will be returned to the Bidder.
- 15.02 If a Bidder wishes to modify its Bid prior to Bid opening, Bidder must withdraw its initial Bid in the manner specified in Paragraph 15.01 and submit a new Bid prior to the date and time for the opening of Bids.
- 15.03 If within 24 hours after Bids are opened any Bidder files a duly signed written notice with Owner and promptly thereafter demonstrates to the reasonable satisfaction of Owner that there was a material and substantial mistake in the preparation of its Bid, the Bidder may withdraw its Bid, and the Bid security will be returned. Thereafter, if the Work is rebid, the Bidder will be disqualified from further bidding on the Work.

ARTICLE 16—OPENING OF BIDS

- 16.01 Bids will be opened at the time and place indicated in the advertisement or invitation to bid and, unless obviously non-responsive, read aloud publicly. An abstract of the amounts of the base Bids and major alternates, if any, will be made available to Bidders after the opening of Bids.

ARTICLE 17—BIDS TO REMAIN SUBJECT TO ACCEPTANCE

- 17.01 All Bids will remain subject to acceptance for the period of time stated in the Bid Form, but Owner may, in its sole discretion, release any Bid and return the Bid security prior to the end of this period.

ARTICLE 18—EVALUATION OF BIDS AND AWARD OF CONTRACT

- 18.01 Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. Owner also reserves the right to waive all minor Bid informalities not involving price, time, or changes in the Work.
- 18.02 Owner will reject the Bid of any Bidder that Owner finds, after reasonable inquiry and evaluation, to not be responsible.
- 18.03 If Bidder purports to add terms or conditions to its Bid, takes exception to any provision of the Bidding Documents, or attempts to alter the contents of the Contract Documents for purposes of the Bid, whether in the Bid itself or in a separate communication to Owner or Engineer, then Owner will reject the Bid as nonresponsive.
- 18.04 If Owner awards the contract for the Work, such award will be to the responsible Bidder submitting the lowest responsive Bid.
- 18.05 *Evaluation of Bids*
- A. In evaluating Bids, Owner will consider whether the Bids comply with the prescribed requirements, and such alternates, unit prices, and other data, as may be requested in the Bid Form or prior to the Notice of Award.
 - B. In the comparison of Bids, alternates will be applied in the same order of priority as listed in the Bid Form. To determine the Bid prices for purposes of comparison, Owner will announce to all bidders a “Base Bid plus alternates” budget after receiving all Bids, but prior to opening them. For comparison purposes alternates will be accepted, following the order of priority established in the Bid Form, until doing so would cause the budget to be exceeded. After determination of the Successful Bidder based on this comparative process and on the responsiveness, responsibility, and other factors set forth in these Instructions, the award may be made to said Successful Bidder on its base Bid and any combination of its additive alternate Bids for which Owner determines funds will be available at the time of award.
 - C. For the determination of the apparent low Bidder when unit price bids are submitted, Bids will be compared on the basis of the total of the products of the estimated quantity of each item and unit price Bid for that item, together with any lump sum items.
 - D. Bid prices will be compared after adjusting for differences in time of Substantial Completion (total number of calendar days to substantially complete the Work) designated by Bidders. The adjusting amount will be determined at the rate set forth in the Agreement for liquidated damages for failing to achieve Substantial Completion, or such other amount that Owner has designated in the Bid Form.
 - 1. The method for calculating the lowest bid for comparison will be the summation of the Bid price shown in the Bid Form plus the product of the Bidder-specified time of Substantial Completion in calendar days times the rate for liquidated damages in dollars per day.
 - 2. This procedure is only used to determine the lowest bid for comparison and contractor selection purposes. The Contract Price for compensation and payment purposes remains the Bid price shown in the Bid Form.
- 18.06 In evaluating whether a Bidder is responsible, Owner will consider the qualifications of the Bidder and may consider the qualifications and experience of Subcontractors and Suppliers proposed for those portions of the Work for which the identity of Subcontractors and Suppliers must be submitted as provided in the Bidding Documents.

- 18.07 Owner may conduct such investigations as Owner deems necessary to establish the responsibility, qualifications, and financial ability of Bidders and any proposed Subcontractors or Suppliers.

ARTICLE 19— BONDS AND INSURANCE

- 19.01 Article 6 of the General Conditions, as may be modified by the Supplementary Conditions, sets forth Owner’s requirements as to performance and payment bonds, other required bonds (if any), and insurance. When the Successful Bidder delivers the executed Agreement to Owner, it must be accompanied by required bonds and insurance documentation.
- 19.02 Article 8, Bid Security, of these Instructions, addresses any requirements for providing bid bonds as part of the bidding process.

ARTICLE 20—SIGNING OF AGREEMENT

- 20.01 When Owner issues a Notice of Award to the Successful Bidder, it will be accompanied by the unexecuted counterparts of the Agreement along with the other Contract Documents as identified in the Agreement. Within 15 days thereafter, Successful Bidder must execute and deliver the required number of counterparts of the Agreement and any bonds and insurance documentation required to be delivered by the Contract Documents to Owner. Within 10 days thereafter, Owner will deliver one fully executed counterpart of the Agreement to Successful Bidder, together with printed and electronic copies of the Contract Documents as stated in Paragraph 2.02 of the General Conditions.

ARTICLE 21—SALES AND USE TAXES

- 21.01 Owner is exempt from **Maine** state sales and use taxes on materials and equipment to be incorporated in the Work. Said taxes must not be included in the Bid. See Supplemental General Conditions for additional information.

ARTICLE 22—FEDERAL REQUIREMENTS

- 22.01 *Disadvantaged Business Enterprise (DBE) Requirements*
- A. Each bidder shall comply with DBE requirements and shall take all necessary affirmative action steps to assure that Disadvantaged firms are used when possible. See Supplemental General Conditions for additional information.
- 22.02 *American Iron and Steel (AIS) Requirements*
- A. Each bidder shall comply with AIS requirements. See Supplemental General Conditions for additional information.
- 22.03 *Build America Buy America Act (BABAA) Requirements*
- A. Each bidder shall comply with BABAA requirements. See Supplemental General Conditions for additional information.
- 22.04 *Davis Bacon Wage Requirements*
- A. Each bidder shall comply with Davis Bacon requirements. See Supplemental General Conditions for additional information.

22.05 *Nondiscrimination in Employment and Labor Standards Requirements*

- A. Each bidder shall comply with Presidents' Executive Order No. 11246 and shall not discriminate in employment practices. See Supplemental General Conditions for additional information.
- B. Each bidder shall submit with their initial bid signed Compliance Statement.
- C. Each bidder shall, if requested, submit a compliance report.
- D. Successful bidders must, if requested, submit a list of all subcontractors and a statement that their practices and policies are in conformity with Executive Order No.11246.
- E. Successful bidders must comply in all aspects with the contract provisions regarding nondiscrimination.

22.06 *Safety and Health Regulations*

- A. This project is subject to all of the Safety and Health Regulations (CFR 29 Part 1926 and all subsequent amendments) as promulgated by the US Department of Labor June 24, 1974. Contractors are urged to become familiar with all the requirements of these regulations.

22.07 *Other*

- A. Each bidder shall comply with the Department of Labor Regulations relating to the Copeland "Anti-Kickback" Act, and the Contract Work Hours and Safety Standards Act. The bidder must also comply with the Safe Drinking Water Act, Clean Air Act, Clean Water Act, Executive Order 11738, and the Environmental Protection Agency regulations (40 CFR Part 15). See Supplemental General Conditions for additional information.

ARTICLE 23—DISCLAIMER

- 23.01 This project is expected to be funded in part by a State Revolving Loan and that neither the State nor any of its departments, agencies, or employees is party to this contract.



BID FORM FOR CONSTRUCTION CONTRACT

The terms used in this Bid with initial capital letters have the meanings stated in the Instructions to Bidders, the General Conditions, and the Supplementary Conditions.

ARTICLE 1—OWNER AND BIDDER

- 1.01 This Bid is submitted to: Washington Academy, 66 Cutler Road, East Machias, Maine 04630
- 1.02 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with Owner in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

ARTICLE 2—ATTACHMENTS TO THIS BID

- 2.01 The following documents are submitted with and made a condition of this Bid:
- A. Required Bid security;
 - B. List of Proposed Subcontractors;
 - C. List of Proposed Suppliers;
 - D. Evidence of authority to do business in the state of the Project; or a written covenant to obtain such authority within the time for acceptance of Bids; and
 - E. Required Bidder Qualification Statement with supporting data.

ARTICLE 3—BASIS OF BID—LUMP SUM

3.01 *Lump Sum Bids*

- A. Bidder will complete the Work in accordance with the Contract Documents for the following lump sum (stipulated) price(s), together with any Unit Prices indicated in Paragraph 3.02:
- 1. Lump Sum Price (Single Lump Sum)

Lump Sum Bid Price	\$
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- B. All specified cash allowance(s) are included in the price(s) set forth below, and have been computed in accordance with Paragraph 13.02 of the General Conditions.

Lump Sum for Cash Allowance 1 – Inspection & Testing Allowance	\$5000.00
Total for all Lump Sum for Cash Allowances	\$5000.00

3.02 *Total Bid Price (Lump Sum and Allowances)*

Total Bid Price (Total of all Lump Sum and Unit Price Bids)	\$
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ARTICLE 4—

ARTICLE 4—TIME OF COMPLETION

- 4.01 Bidder agrees that the Work will be substantially complete and will be completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions on or before the dates or within the number of calendar days indicated in the Agreement.
- 4.02 Bidder accepts the provisions of the Agreement as to liquidated damages.

ARTICLE 5—BIDDER’S ACKNOWLEDGEMENTS: ACCEPTANCE PERIOD, INSTRUCTIONS, AND RECEIPT OF ADDENDA

5.01 *Bid Acceptance Period*

- A. This Bid will remain subject to acceptance for 60 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

5.02 *Instructions to Bidders*

- A. Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security.

5.03 *Receipt of Addenda*

- A. Bidder hereby acknowledges receipt of the following Addenda: [Add rows as needed. Bidder is to complete table.]

Addendum Number	Addendum Date

ARTICLE 6—BIDDER’S REPRESENTATIONS AND CERTIFICATIONS

6.01 *Bidder's Representations*

- A. In submitting this Bid, Bidder represents the following:
 - 1. Bidder has examined and carefully studied the Bidding Documents, including Addenda.
 - 2. Bidder has visited the Site, conducted a thorough visual examination of the Site and adjacent areas, and become familiar with the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
 - 3. Bidder is familiar with all Laws and Regulations that may affect cost, progress, and performance of the Work.
 - 4. Bidder has carefully studied the reports of explorations and tests of subsurface conditions at or adjacent to the Site and the drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, with respect to the Technical Data in such reports and drawings.
 - 5. Bidder has carefully studied the reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in

the Supplementary Conditions, with respect to Technical Data in such reports and drawings.

6. Bidder has considered the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Technical Data identified in the Supplementary Conditions or by definition, with respect to the effect of such information, observations, and Technical Data on (a) the cost, progress, and performance of the Work; (b) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, if selected as Contractor; and (c) Bidder's (Contractor's) safety precautions and programs.
7. Based on the information and observations referred to in the preceding paragraph, Bidder agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract.
8. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.
9. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and of discrepancies between Site conditions and the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.
10. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.
11. The submission of this Bid constitutes an incontrovertible representation by Bidder that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

6.02 *Bidder's Certifications*

A. The Bidder certifies the following:

1. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation.
2. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid.
3. Bidder has not solicited or induced any individual or entity to refrain from bidding.
4. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 8.02.A:
 - a. Corrupt practice means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process.
 - b. Fraudulent practice means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition.

- c. Collusive practice means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels.
- d. Coercive practice means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

BIDDER hereby submits this Bid as set forth above:

Bidder:

(typed or printed name of organization)

By: _____
(individual's signature)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Date: _____
(typed or printed)

If Bidder is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.

Attest: _____
(individual's signature)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Date: _____
(typed or printed)

Address for giving notices:

Bidder's Contact:

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Phone: _____

Email: _____

Address: _____

Bidder's Contractor License No.: (if applicable) _____

BID BOND (PENAL SUM FORM)

Bidder Name: [Full formal name of Bidder] Address (<i>principal place of business</i>): [Address of Bidder's principal place of business]	Surety Name: [Full formal name of Surety] Address (<i>principal place of business</i>): [Address of Surety's principal place of business]
Owner Name: Washington Academy Address (<i>principal place of business</i>): 66 Cutler Road East Machias, Maine 04630	Bid Project (<i>name and location</i>): Public Water System Consolidation Washington Academy 66 Cutler Road East Machias, Maine 04630 Jud McBrine, Head of School Bid Due Date: January 6, 2025
Bond Penal Sum: [Amount] Date of Bond: [Date]	
Surety and Bidder, intending to be legally bound hereby, subject to the terms set forth in this Bid Bond, do each cause this Bid Bond to be duly executed by an authorized officer, agent, or representative.	
Bidder _____ (<i>Full formal name of Bidder</i>)	Surety _____ (<i>Full formal name of Surety</i>) (<i>corporate seal</i>)
By: _____ (<i>Signature</i>)	By: _____ (<i>Signature</i>) (<i>Attach Power of Attorney</i>)
Name: _____ (<i>Printed or typed</i>)	Name: _____ (<i>Printed or typed</i>)
Title: _____	Title: _____
Attest: _____ (<i>Signature</i>)	Attest: _____ (<i>Signature</i>)
Name: _____ (<i>Printed or typed</i>)	Name: _____ (<i>Printed or typed</i>)
Title: _____	Title: _____
Notes: (1) Note: Addresses are to be used for giving any required notice. (2) Provide execution by any additional parties, such as joint venturers, if necessary.	

1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to pay to Owner upon default of Bidder the penal sum set forth on the face of this Bond. Payment of the penal sum is the extent of Bidder's and Surety's liability. Recovery of such penal sum under the terms of this Bond will be Owner's sole and exclusive remedy upon default of Bidder.
2. Default of Bidder occurs upon the failure of Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents.
3. This obligation will be null and void if:
 - 3.1. Owner accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents, or
 - 3.2. All Bids are rejected by Owner, or
 - 3.3. Owner fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to by Surety when required by Paragraph 5 hereof).
4. Payment under this Bond will be due and payable upon default of Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from Owner, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.
5. Surety waives notice of any and all defenses based on or arising out of any time extension to issue Notice of Award agreed to in writing by Owner and Bidder, provided that the total time for issuing Notice of Award including extensions does not in the aggregate exceed 120 days from the Bid due date without Surety's written consent.
6. No suit or action will be commenced under this Bond prior to 30 calendar days after the notice of default required in Paragraph 4 above is received by Bidder and Surety, and in no case later than one year after the Bid due date.
7. Any suit or action under this Bond will be commenced only in a court of competent jurisdiction located in the state in which the Project is located.
8. Notices required hereunder must be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier, or by United States Postal Service registered or certified mail, return receipt requested, postage pre-paid, and will be deemed to be effective upon receipt by the party concerned.
9. Surety shall cause to be attached to this Bond a current and effective Power of Attorney evidencing the authority of the officer, agent, or representative who executed this Bond on behalf of Surety to execute, seal, and deliver such Bond and bind the Surety thereby.
10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond will be deemed to be included herein as if set forth at length. If any provision of this Bond conflicts with any applicable statute, then the provision of said statute governs and the remainder of this Bond that is not in conflict therewith continues in full force and effect.
11. The term "Bid" as used herein includes a Bid, offer, or proposal as applicable.

NOTICE OF AWARD

Date of Issuance:

Owner: Washington Academy

Owner's Project No.:

Engineer: DuBois & King Inc.

Engineer's Project No.: 229946

Project: Public Water System Consolidation

Contract Name: Washington Academy Public Water System Consolidation

Bidder:

Bidder's Address:

You are notified that Owner has accepted your Bid dated [date] for the above Contract, and that you are the Successful Bidder and are awarded a Contract for:

Construction of a new water treatment building, water treatment equipment, and water supply and distribution infrastructure.

The Contract Price of the awarded Contract is \$[Contract Price]. Contract Price is subject to adjustment based on the provisions of the Contract, including but not limited to those governing changes, Unit Price Work, and Work performed on a cost-plus-fee basis, as applicable.

[Number of copies sent] unexecuted counterparts of the Agreement accompany this Notice of Award, and one copy of the Contract Documents accompanies this Notice of Award, or has been transmitted or made available to Bidder electronically.

Drawings will be delivered separately from the other Contract Documents.

You must comply with the following conditions precedent within 15 days of the date of receipt of this Notice of Award:

1. Deliver to Owner [number of copies sent] counterparts of the Agreement, signed by Bidder (as Contractor).
2. Deliver with the signed Agreement(s) the Contract security (such as required performance and payment bonds) and insurance documentation, as specified in the Instructions to Bidders and in the General Conditions, Articles 2 and 6.
3. Other conditions precedent (if any): [Describe other conditions that require Successful Bidder's compliance]

Failure to comply with these conditions within the time specified will entitle Owner to consider you in default, annul this Notice of Award, and declare your Bid security forfeited.

Within 10 days after you comply with the above conditions, Owner will return to you one fully signed counterpart of the Agreement, together with any additional copies of the Contract Documents as indicated in Paragraph 2.02 of the General Conditions.

Owner: Washington Academy

By (signature): _____

Name (printed): Jud McBrine

Title: Head of School

Copy: Engineer

AGREEMENT BETWEEN OWNER AND CONTRACTOR FOR CONSTRUCTION CONTRACT (STIPULATED PRICE)

This Agreement is by and between Washington Academy (“Owner”) and [name of contracting entity] (“Contractor”).

Terms used in this Agreement have the meanings stated in the General Conditions and the Supplementary Conditions.

Owner and Contractor hereby agree as follows:

ARTICLE 1—WORK

1.01 Contractor shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described as follows: construction of new water treatment facility, construction of new water supply and distribution services, and abandon 2 drinking water wells.

ARTICLE 2—THE PROJECT

2.01 The Project, of which the Work under the Contract Documents is a part, is generally described as follows: public water system consolidation

ARTICLE 3—ENGINEER

3.01 The Owner has retained DuBois & King Inc. (“Engineer”) to act as Owner’s representative, assume all duties and responsibilities of Engineer, and have the rights and authority assigned to Engineer in the Contract.

3.02 The part of the Project that pertains to the Work has been designed by Engineer.

ARTICLE 4—CONTRACT TIMES

4.01 *Time is of the Essence*

A. All time limits for Milestones, if any, Substantial Completion, and completion and readiness for final payment as stated in the Contract Documents are of the essence of the Contract.

4.02 *Contract Times: Dates*

A. The Work will be substantially complete on or before April 18, 2025, and completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions on or before May 9, 2025.

4.05 *Liquidated Damages*

A. Contractor and Owner recognize that time is of the essence as stated in Paragraph 4.01 above and that Owner will suffer financial and other losses if the Work is not completed and Milestones not achieved within the Contract Times, as duly modified. The parties also recognize the delays, expense, and difficulties involved in proving, in a legal or arbitration proceeding, the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty):

1. *Substantial Completion*: Contractor shall pay Owner \$500.00 for each day that expires after the time (as duly adjusted pursuant to the Contract) specified above for Substantial Completion, until the Work is substantially complete.
 2. *Completion of Remaining Work*: After Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Times (as duly adjusted pursuant to the Contract) for completion and readiness for final payment, Contractor shall pay Owner \$500.00 for each day that expires after such time until the Work is completed and ready for final payment.
 3. Liquidated damages for failing to timely attain Milestones, Substantial Completion, and final completion are not additive, and will not be imposed concurrently.
- B. If Owner recovers liquidated damages for a delay in completion by Contractor, then such liquidated damages are Owner's sole and exclusive remedy for such delay, and Owner is precluded from recovering any other damages, whether actual, direct, excess, or consequential, for such delay, except for special damages (if any) specified in this Agreement.

4.06 *Special Damages*

- A. Contractor shall reimburse Owner (1) for any fines or penalties imposed on Owner as a direct result of the Contractor's failure to attain Substantial Completion according to the Contract Times, and (2) for the actual costs reasonably incurred by Owner for engineering, construction observation, inspection, and administrative services needed after the time specified in Paragraph 4.02 for Substantial Completion (as duly adjusted pursuant to the Contract), until the Work is substantially complete.
- B. After Contractor achieves Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Times, Contractor shall reimburse Owner for the actual costs reasonably incurred by Owner for engineering, construction observation, inspection, and administrative services needed after the time specified in Paragraph 4.02 for Work to be completed and ready for final payment (as duly adjusted pursuant to the Contract), until the Work is completed and ready for final payment.
- C. The special damages imposed in this paragraph are supplemental to any liquidated damages for delayed completion established in this Agreement.

ARTICLE 5—CONTRACT PRICE

- 5.01 Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents, the amounts that follow, subject to adjustment under the Contract:
- A. For all Work other than Unit Price Work, a lump sum of \$[number].
All specific cash allowances are included in the above price in accordance with Paragraph 13.02 of the General Conditions.
 - B. For all Work, at the prices stated in Contractor's Bid, attached hereto as an exhibit.

ARTICLE 6—PAYMENT PROCEDURES

6.01 *Submittal and Processing of Payments*

- A. Contractor shall submit Applications for Payment in accordance with Article 15 of the General Conditions. Applications for Payment will be processed by Engineer as provided in the General Conditions.

6.02 *Progress Payments; Retainage*

- A. Owner shall make progress payments on the basis of Contractor's Applications for Payment on or about the 5th day of each month during performance of the Work as provided in Paragraph 6.02.A.1 below, provided that such Applications for Payment have been submitted in a timely manner and otherwise meet the requirements of the Contract. All such payments will be measured by the Schedule of Values established as provided in the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no Schedule of Values, as provided elsewhere in the Contract.
 - 1. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as Owner may withhold, including but not limited to liquidated damages, in accordance with the Contract.
 - a. 90 percent of the value of the Work completed (with the balance being retainage).
 - 1) If 50 percent or more of the Work has been completed, as determined by Engineer, and if the character and progress of the Work have been satisfactory to Owner and Engineer, then as long as the character and progress of the Work remain satisfactory to Owner and Engineer, there will be no additional retainage; and
 - b. 90 percent of cost of materials and equipment not incorporated in the Work (with the balance being retainage).
- B. Upon Substantial Completion, Owner shall pay an amount sufficient to increase total payments to Contractor to 100 percent of the Work completed, less such amounts set off by Owner pursuant to Paragraph 15.01.E of the General Conditions, and less 200 percent of Engineer's estimate of the value of Work to be completed or corrected as shown on the punch list of items to be completed or corrected prior to final payment.

6.03 *Final Payment*

- A. Upon final completion and acceptance of the Work, Owner shall pay the remainder of the Contract Price in accordance with Paragraph 15.06 of the General Conditions.

6.04 *Consent of Surety*

- A. Owner will not make final payment, or return or release retainage at Substantial Completion or any other time, unless Contractor submits written consent of the surety to such payment, return, or release.

ARTICLE 7—CONTRACT DOCUMENTS

7.01 *Contents*

- A. The Contract Documents consist of all of the following:
 1. This Agreement.
 2. Bonds:
 - a. Performance bond (together with power of attorney).
 - b. Payment bond (together with power of attorney).
 3. General Conditions.
 4. Supplementary Conditions.
 5. Specifications as listed in the table of contents of the project manual (copy of list attached).
 6. Drawings (not attached but incorporated by reference) consisting of 28 sheets with each sheet bearing the following general title: Public Water System Consolidation.
 8. Addenda (numbers [number] to [number], inclusive).
 9. Exhibits to this Agreement (enumerated as follows):
 - a. [list exhibits]
 10. The following which may be delivered or issued on or after the Effective Date of the Contract and are not attached hereto:
 - a. Notice to Proceed.
 - b. Work Change Directives.
 - c. Change Orders.
 - d. Field Orders.
 - e. Warranty Bond, if any.
- B. The Contract Documents listed in Paragraph 7.01.A are attached to this Agreement (except as expressly noted otherwise above).
- C. There are no Contract Documents other than those listed above in this Article 7.
- D. The Contract Documents may only be amended, modified, or supplemented as provided in the Contract.

ARTICLE 8—REPRESENTATIONS, CERTIFICATIONS, AND STIPULATIONS

8.01 *Contractor's Representations*

- A. In order to induce Owner to enter into this Contract, Contractor makes the following representations:
 1. Contractor has examined and carefully studied the Contract Documents, including Addenda.

2. Contractor has visited the Site, conducted a thorough visual examination of the Site and adjacent areas, and become familiar with the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
3. Contractor is familiar with all Laws and Regulations that may affect cost, progress, and performance of the Work.
4. Contractor has carefully studied the reports of explorations and tests of subsurface conditions at or adjacent to the Site and the drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, with respect to the Technical Data in such reports and drawings.
5. Contractor has carefully studied the reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, with respect to Technical Data in such reports and drawings.
6. Contractor has considered the information known to Contractor itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Contract Documents; and the Technical Data identified in the Supplementary Conditions or by definition, with respect to the effect of such information, observations, and Technical Data on (a) the cost, progress, and performance of the Work; (b) the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor; and (c) Contractor's safety precautions and programs.
7. Based on the information and observations referred to in the preceding paragraph, Contractor agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract.
8. Contractor is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Contract Documents.
9. Contractor has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and of discrepancies between Site conditions and the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.
10. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.
11. Contractor's entry into this Contract constitutes an incontrovertible representation by Contractor that without exception all prices in the Agreement are premised upon performing and furnishing the Work required by the Contract Documents.

8.02 *Contractor's Certifications*

- A. Contractor certifies that it has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for or in executing the Contract. For the purposes of this Paragraph 8.02:

1. "corrupt practice" means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process or in the Contract execution;
2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process or the execution of the Contract to the detriment of Owner, (b) to establish Bid or Contract prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;
3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish Bid prices at artificial, non-competitive levels; and
4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

8.03 *Standard General Conditions*

- A. Owner stipulates that if the General Conditions that are made a part of this Contract are EJCDC® C-700, Standard General Conditions for the Construction Contract (2018), published by the Engineers Joint Contract Documents Committee, and if Owner is the party that has furnished said General Conditions, then Owner has plainly shown all modifications to the standard wording of such published document to the Contractor, through a process such as highlighting or "track changes" (redline/strikeout), or in the Supplementary Conditions.

IN WITNESS WHEREOF, Owner and Contractor have signed this Agreement.

1. This Agreement will be effective on [indicate date on which Contract becomes effective] (which is the Effective Date of the Contract).

Owner:

(typed or printed name of organization)

By: _____
(individual's signature)

Date: _____
(date signed)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Attest: _____
(individual's signature)

Title: _____
(typed or printed)

Address for giving notices:

Designated Representative:

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Address:

Phone: _____

Email: _____

(If [Type of Entity] is a corporation, attach evidence of authority to sign. If [Type of Entity] is a public body, attach evidence of authority to sign and resolution or other documents authorizing execution of this Agreement.)

Contractor:

(typed or printed name of organization)

By: _____
(individual's signature)

Date: _____
(date signed)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

(If [Type of Entity] is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.)

Attest: _____
(individual's signature)

Title: _____
(typed or printed)

Address for giving notices:

Designated Representative:

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Address:

Phone: _____

Email: _____

License No.: _____
(where applicable)

State: _____

NOTICE TO PROCEED

Owner: Washington Academy Owner's Project No.: _____
Engineer: DuBois & King Inc. Engineer's Project No.: 229946
Contractor: _____ Contractor's Project No.: _____
Project: Public Water System Consolidation
Contract Name: Washington Academy Public Water System Consolidation
Effective Date of Contract: _____

Owner hereby notifies Contractor that the Contract Times under the above Contract will commence to run on [date Contract Times are to start] pursuant to Paragraph 4.01 of the General Conditions.

On that date, Contractor shall start performing its obligations under the Contract Documents. No Work will be done at the Site prior to such date.

In accordance with the Agreement: [Select one of the following two alternatives, insert dates or number of days, and delete the other alternative.]

The date by which Substantial Completion must be achieved is Monday, September 1, 2025, and the date by which readiness for final payment must be achieved is Monday, September 22, 2025.

Before starting any Work at the Site, Contractor must comply with the following:

[Note any access limitations, security procedures, or other restrictions]

Owner: Washington Academy
By (signature): _____
Name (printed): Jud McBrine
Title: Head of School
Date Issued: _____
Copy: Engineer

PERFORMANCE BOND

Contractor Name: [Full formal name of Contractor] Address <i>(principal place of business)</i> : [Address of Contractor's principal place of business]	Surety Name: [Full formal name of Surety] Address <i>(principal place of business)</i> : [Address of Surety's principal place of business]
Owner Name: Washington Academy Mailing address <i>(principal place of business)</i> : 66 Cutler Road East Machias, Maine 04630	Contract Description <i>(name and location)</i> : Public Water System Consolidation Washington Academy 66 Cutler Road East Machias, Maine 04630 Jud McBrine, Head of School Contract Price: [Amount from Contract] Effective Date of Contract: [Date from Contract]
Bond Bond Amount: [Amount] Date of Bond: [Date] <i>(Date of Bond cannot be earlier than Effective Date of Contract)</i> Modifications to this Bond form: <input type="checkbox"/> None <input type="checkbox"/> See Paragraph 16	
Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth in this Performance Bond, do each cause this Performance Bond to be duly executed by an authorized officer, agent, or representative.	
Contractor as Principal	Surety
_____ <i>(Full formal name of Contractor)</i>	_____ <i>(Full formal name of Surety) (corporate seal)</i>
By: _____ <i>(Signature)</i>	By: _____ <i>(Signature)(Attach Power of Attorney)</i>
Name: _____ <i>(Printed or typed)</i>	Name: _____ <i>(Printed or typed)</i>
Title: _____	Title: _____
Attest: _____ <i>(Signature)</i>	Attest: _____ <i>(Signature)</i>
Name: _____ <i>(Printed or typed)</i>	Name: _____ <i>(Printed or typed)</i>
Title: _____	Title: _____
<i>Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party is considered plural where applicable.</i>	

The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.

1. If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Paragraph 3.
2. If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond will arise after:
 - 2.1. The Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice may indicate whether the Owner is requesting a conference among the Owner, Contractor, and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Paragraph 3.1 will be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor, and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement does not waive the Owner's right, if any, subsequently to declare a Contractor Default;
 - 2.2. The Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and
 - 2.3. The Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.
3. Failure on the part of the Owner to comply with the notice requirement in Paragraph 3.1 does not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.
4. When the Owner has satisfied the conditions of Paragraph 3, the Surety shall promptly and at the Surety's expense take one of the following actions:
 - 4.1. Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;
 - 4.2. Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors;
 - 4.3. Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and a contractor selected with the Owners concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Paragraph 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or
 - 4.4. Waive its right to perform and complete, arrange for completion, or obtain a new contractor, and with reasonable promptness under the circumstances:

- 5.4.1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or
 - 5.4.2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.
- 5. If the Surety does not proceed as provided in Paragraph 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Paragraph 5.4, and the Owner refuses the payment, or the Surety has denied liability, in whole or in part, without further notice, the Owner shall be entitled to enforce any remedy available to the Owner.
- 6. If the Surety elects to act under Paragraph 5.1, 5.2, or 5.3, then the responsibilities of the Surety to the Owner will not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety will not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication for:
 - 6.1. the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;
 - 6.2. 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 Paragraph 5; and
 - 6.3. liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.
- 7. If the Surety elects to act under Paragraph 5.1, 5.3, or 5.4, the Surety's liability is limited to the amount of this Bond.
- 8. The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price will not be reduced or set off on account of any such unrelated obligations. No right of action will accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors, and assigns.
- 9. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.
- 10. Any proceeding, legal or equitable, under this Bond must be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and must be instituted within two years after a declaration of Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this paragraph are void or prohibited by law, the minimum periods of limitations available to sureties as a defense in the jurisdiction of the suit will be applicable.
- 11. Notice to the Surety, the Owner, or the Contractor must be mailed or delivered to the address shown on the page on which their signature appears.
- 12. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement will be deemed deleted therefrom and provisions conforming to such

statutory or other legal requirement will be deemed incorporated herein. When so furnished, the intent is that this Bond will be construed as a statutory bond and not as a common law bond.

13. Definitions

- 13.1. *Balance of the Contract Price*—The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made including allowance for the Contractor for any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.
 - 13.2. *Construction Contract*—The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.
 - 13.3. *Contractor Default*—Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.
 - 13.4. *Owner Default*—Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.
 - 13.5. *Contract Documents*—All the documents that comprise the agreement between the Owner and Contractor.
14. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond will be deemed to be Subcontractor and the term Owner will be deemed to be Contractor.
15. Modifications to this Bond are as follows: [Describe modification or enter "None"]

WARRANTY BOND

<p>Contractor</p> <p>Name: [Full formal name of Contractor]</p> <p>Address (<i>principal place of business</i>): [Address of Contractor's principal place of business]</p>	<p>Surety</p> <p>Name: [Full formal name of Surety]</p> <p>Address (<i>principal place of business</i>): [Insert address of Surety's principal place of business]</p>
<p>Owner</p> <p>Name: Washington Academy</p> <p>Address (<i>principal place of business</i>): 66 Cutler Road East Machias, Maine 04630</p>	<p>Construction Contract</p> <p>Description (<i>name and location</i>): Public Water System Consolidation Washington Academy 66 Cutler Road East Machias, Maine 04630 Jud McBrine, Head of School</p> <p>Contract Price: [Amount from Contract]</p> <p>Effective Date of Contract: [Date from Contract]</p> <p>Contract's Date of Substantial Completion: September 1, 2025</p>
<p>Bond</p> <p>Bond Amount: [Amount] Bond Period: Commencing 364 days after Substantial Completion of the Work under the Construction Contract, and continuing until two years after such Substantial Completion.</p> <p>Date of Bond: [Date]</p> <p>Modifications to this Bond form: <input type="checkbox"/> None <input type="checkbox"/> See Paragraph 9</p>	
<p>Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth herein, do each cause this Warranty Bond to be duly executed by an authorized officer, agent, or representative.</p>	
<p>Contractor as Principal</p>	<p>Surety</p>
<p style="text-align: center;"><i>(Full formal name of Contractor)</i></p> <p>By: _____ <i>(Signature)</i></p> <p>Name: _____ <i>(Printed or typed)</i></p> <p>Title: _____</p> <p>Attest: _____ <i>(Signature)</i></p> <p>Name: _____ <i>(Printed or typed)</i></p> <p>Title: _____</p>	<p style="text-align: center;"><i>(Full formal name of Surety) (corporate seal)</i></p> <p>By: _____ <i>(Signature) (Attach Power of Attorney)</i></p> <p>Name: _____ <i>(Printed or typed)</i></p> <p>Title: _____</p> <p>Attest: _____ <i>(Signature)</i></p> <p>Name: _____ <i>(Printed or typed)</i></p> <p>Title: _____</p>
<p><i>Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party is considered plural where applicable.</i></p>	

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner for the performance of the Construction Contract's Correction Period Obligations. The Construction Contract is incorporated herein by reference.
2. If the Contractor performs the Correction Period Obligations, the Surety and the Contractor shall have no obligation under this Warranty Bond.
3. If Owner gives written notice to Contractor and Surety during the Bond Period of Contractor's obligation under the Correction Period Obligations, and Contractor does not fulfill such obligation, then Surety shall be responsible for fulfillment of such Correction Period Obligations. Surety shall either fulfill the Correction Period Obligations itself, through its agents or contractors, or, in the alternative, Surety may waive the right to fulfill the Correction Period Obligations itself, and reimburse the Owner for all resulting costs incurred by Owner in performing Contractor's Correction Period Obligations, including but not limited to correction, removal, replacement, and repair costs.
4. The Surety's liability is limited to the amount of this Warranty Bond. Renewal or continuation of the Warranty Bond will not modify such amount, unless expressly agreed to by Surety in writing.
5. The Surety shall have no liability under this Warranty Bond for obligations of the Contractor that are unrelated to the Construction Contract. No right of action will accrue on this Warranty Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors, and assigns.
6. Any proceeding, legal or equitable, under this Warranty Bond may be instituted in any court of competent jurisdiction in the location in which the Work or part of the Work is located and must be instituted within two years after the Surety refuses or fails to perform its obligations under this Warranty Bond.
7. Written notice to the Surety, the Owner, or the Contractor must be mailed or delivered to the address shown in this Warranty Bond.
8. Definitions
 - 8.1. *Construction Contract*—The agreement between the Owner and Contractor identified on the cover page of this Warranty Bond, including all Contract Documents and changes made to the agreement and the Contract Documents.
 - 8.2. *Contract Documents*—All the documents that comprise the agreement between the Owner and Contractor.
 - 8.3. *Correction Period Obligations*—The duties, responsibilities, commitments, and obligations of the Contractor with respect to correction or replacement of defective Work, as set forth in the Construction Contract's Correction Period clause, EJCDC® C-700, Standard General Conditions of the Construction Contract (2018), Paragraph 15.08, as duly modified.
 - 8.4. *Substantial Completion*—As defined in the Construction Contract.
 - 8.5. *Work*—As defined in the Construction Contract.
9. Modifications to this Bond are as follows: [Describe modification or enter "None"]

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner for the performance of the Construction Contract's Correction Period Obligations. The Construction Contract is incorporated herein by reference.
2. If the Contractor performs the Correction Period Obligations, the Surety and the Contractor shall have no obligation under this Warranty Bond.
3. If Owner gives written notice to Contractor and Surety during the Bond Period of Contractor's obligation under the Correction Period Obligations, and Contractor does not fulfill such obligation, then Surety shall be responsible for fulfillment of such Correction Period Obligations. Surety shall either fulfill the Correction Period Obligations itself, through its agents or contractors, or, in the alternative, Surety may waive the right to fulfill the Correction Period Obligations itself, and reimburse the Owner for all resulting costs incurred by Owner in performing Contractor's Correction Period Obligations, including but not limited to correction, removal, replacement, and repair costs.
4. The Surety's liability is limited to the amount of this Warranty Bond. Renewal or continuation of the Warranty Bond will not modify such amount, unless expressly agreed to by Surety in writing.
5. The Surety shall have no liability under this Warranty Bond for obligations of the Contractor that are unrelated to the Construction Contract. No right of action will accrue on this Warranty Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors, and assigns.
6. Any proceeding, legal or equitable, under this Warranty Bond may be instituted in any court of competent jurisdiction in the location in which the Work or part of the Work is located and must be instituted within two years after the Surety refuses or fails to perform its obligations under this Warranty Bond.
7. Written notice to the Surety, the Owner, or the Contractor must be mailed or delivered to the address shown in this Warranty Bond.
8. Definitions
 - 8.1. *Construction Contract*—The agreement between the Owner and Contractor identified on the cover page of this Warranty Bond, including all Contract Documents and changes made to the agreement and the Contract Documents.
 - 8.2. *Contract Documents*—All the documents that comprise the agreement between the Owner and Contractor.
 - 8.3. *Correction Period Obligations*—The duties, responsibilities, commitments, and obligations of the Contractor with respect to correction or replacement of defective Work, as set forth in the Construction Contract's Correction Period clause, EJCDC® C-700, Standard General Conditions of the Construction Contract (2018), Paragraph 15.08, as duly modified.
 - 8.4. *Substantial Completion*—As defined in the Construction Contract.
 - 8.5. *Work*—As defined in the Construction Contract.
9. Modifications to this Bond are as follows: [Describe modification or enter "None"]

PAYMENT BOND

Contractor Name: [Full formal name of Contractor] Address (<i>principal place of business</i>): [Address of Contractor's principal place of business]	Surety Name: [Full formal name of Surety] Address (<i>principal place of business</i>): [Address of Surety's principal place of business]
Owner Name: Washington Academy Mailing address (<i>principal place of business</i>): 66 Cutler Road East Machias, Maine 04630	Contract Description (<i>name and location</i>): Public Water System Consolidation Washington Academy 66 Cutler Road East Machias, Maine 04630 Jud McBrine, Head of School Contract Price: [Amount, from Contract] Effective Date of Contract: [Date, from Contract]
Bond Bond Amount: [Amount] Date of Bond: [Date] (<i>Date of Bond cannot be earlier than Effective Date of Contract</i>) Modifications to this Bond form: <input type="checkbox"/> None <input type="checkbox"/> See Paragraph 18	
Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth in this Payment Bond, do each cause this Payment Bond to be duly executed by an authorized officer, agent, or representative.	
Contractor as Principal	Surety
_____ (<i>Full formal name of Contractor</i>)	_____ (<i>Full formal name of Surety</i>) (<i>corporate seal</i>)
By: _____ (<i>Signature</i>)	By: _____ (<i>Signature</i>)(<i>Attach Power of Attorney</i>)
Name: _____ (<i>Printed or typed</i>)	Name: _____ (<i>Printed or typed</i>)
Title: _____	Title: _____
Attest: _____ (<i>Signature</i>)	Attest: _____ (<i>Signature</i>)
Name: _____ (<i>Printed or typed</i>)	Name: _____ (<i>Printed or typed</i>)
Title: _____	Title: _____
Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party is considered plural where applicable.	

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner to pay for labor, materials, and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference, subject to the following terms.
2. If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies, and holds harmless the Owner from claims, demands, liens, or suits by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.
3. If there is no Owner Default under the Construction Contract, the Surety's obligation to the Owner under this Bond will arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Paragraph 13) of claims, demands, liens, or suits against the Owner or the Owner's property by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, and tendered defense of such claims, demands, liens, or suits to the Contractor and the Surety.
4. When the Owner has satisfied the conditions in Paragraph 3, the Surety shall promptly and at the Surety's expense defend, indemnify, and hold harmless the Owner against a duly tendered claim, demand, lien, or suit.
5. The Surety's obligations to a Claimant under this Bond will arise after the following:
 - 5.1. Claimants who do not have a direct contract with the Contractor
 - 5.1.1. have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and
 - 5.1.2. have sent a Claim to the Surety (at the address described in Paragraph 13).
 - 5.2. Claimants who are employed by or have a direct contract with the Contractor have sent a Claim to the Surety (at the address described in Paragraph 13).
6. If a notice of non-payment required by Paragraph 5.1.1 is given by the Owner to the Contractor, that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Paragraph 5.1.1.
7. When a Claimant has satisfied the conditions of Paragraph 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:
 - 7.1. Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and
 - 7.2. Pay or arrange for payment of any undisputed amounts.
 - 7.3. The Surety's failure to discharge its obligations under Paragraph 7.1 or 7.2 will not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Paragraph 7.1 or 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.

8. The Surety's total obligation will not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Paragraph 7.3, and the amount of this Bond will be credited for any payments made in good faith by the Surety.
9. Amounts owed by the Owner to the Contractor under the Construction Contract will be used for the performance of the Construction Contract and to satisfy claims, if any, under any construction performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfying obligations of the Contractor and Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.
10. The Surety shall not be liable to the Owner, Claimants, or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligation to make payments to or give notice on behalf of Claimants, or otherwise have any obligations to Claimants under this Bond.
11. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.
12. No suit or action will be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Paragraph 5.1.2 or 5.2, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit will be applicable.
13. Notice and Claims to the Surety, the Owner, or the Contractor must be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, will be sufficient compliance as of the date received.
14. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement will be deemed deleted here from and provisions conforming to such statutory or other legal requirement will be deemed incorporated herein. When so furnished, the intent is that this Bond will be construed as a statutory bond and not as a common law bond.
15. Upon requests by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.
16. Definitions
 - 16.1. *Claim*—A written statement by the Claimant including at a minimum:
 - 16.1.1. The name of the Claimant;
 - 16.1.2. The name of the person for whom the labor was done, or materials or equipment furnished;
 - 16.1.3. A copy of the agreement or purchase order pursuant to which labor, materials, or equipment was furnished for use in the performance of the Construction Contract;
 - 16.1.4. A brief description of the labor, materials, or equipment furnished;

- 16.1.5. The date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
 - 16.1.6. The total amount earned by the Claimant for labor, materials, or equipment furnished as of the date of the Claim;
 - 16.1.7. The total amount of previous payments received by the Claimant; and
 - 16.1.8. The total amount due and unpaid to the Claimant for labor, materials, or equipment furnished as of the date of the Claim.
- 16.2. *Claimant*—An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials, or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic's lien or similar statute against the real property upon which the Project is located. The intent of this Bond is to include without limitation in the terms of "labor, materials, or equipment" that part of the water, gas, power, light, heat, oil, gasoline, telephone service, or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials, or equipment were furnished.
- 16.3. *Construction Contract*—The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.
- 16.4. *Owner Default*—Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.
- 16.5. *Contract Documents*—All the documents that comprise the agreement between the Owner and Contractor.
17. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond will be deemed to be Subcontractor and the term Owner will be deemed to be Contractor.
18. Modifications to this Bond are as follows: [Describe modification or enter "None"]

Contractor's Application for Payment

Owner: <u>Washington Academy</u>	Owner's Project No.: _____
Engineer: <u>DuBois & King Inc.</u>	Engineer's Project No.: <u>229946</u>
Contractor: _____	Contractor's Project No.: _____
Project: <u>Public Water System Consolidation</u>	
Contract: <u>Washington Academy Public Water System Consolidation</u>	
Application No.: _____	Application Date: _____
Application Period: From _____	to _____

1. Original Contract Price	\$	-
2. Net change by Change Orders	\$	-
3. Current Contract Price (Line 1 + Line 2)	\$	-
4. Total Work completed and materials stored to date (Sum of Column G Lump Sum Total and Column J Unit Price Total)	\$	-
5. Retainage		
a. _____ X \$ _____ Work Completed	\$	-
b. _____ X \$ _____ Stored Materials	\$	-
c. Total Retainage (Line 5.a + Line 5.b)	\$	-
6. Amount eligible to date (Line 4 - Line 5.c)	\$	-
7. Less previous payments (Line 6 from prior application)		
8. Amount due this application	\$	-
9. Balance to finish, including retainage (Line 3 - Line 4)	\$	-

Contractor's Certification
 The undersigned Contractor certifies, to the best of its knowledge, the following:
 (1) All previous progress payments received from Owner on account of Work done under the Contract have been applied on account to discharge Contractor's legitimate obligations incurred in connection with the Work covered by prior Applications for Payment;
 (2) Title to all Work, materials and equipment incorporated in said Work, or otherwise listed in or covered by this Application for Payment, will pass to Owner at time of payment free and clear of all liens, security interests, and encumbrances (except such as are covered by a bond acceptable to Owner indemnifying Owner against any such liens, security interest, or encumbrances); and
 (3) All the Work covered by this Application for Payment is in accordance with the Contract Documents and is not defective.

Contractor: _____
 Signature: _____ Date: _____

<p>Recommended by Engineer</p> <p>By: _____</p> <p>Title: _____</p> <p>Date: _____</p> <p>Approved by Funding Agency</p> <p>By: _____</p> <p>Title: _____</p> <p>Date: _____</p>	<p>Approved by Owner</p> <p>By: _____</p> <p>Title: _____</p> <p>Date: _____</p> <p>By: _____</p> <p>Title: _____</p> <p>Date: _____</p>
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STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

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STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

ARTICLE 1—DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

- A. Wherever used in the Bidding Requirements or Contract Documents, a term printed with initial capital letters, including the term's singular and plural forms, will have the meaning indicated in the definitions below. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.
1. *Addenda*—Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.
 2. *Agreement*—The written instrument, executed by Owner and Contractor, that sets forth the Contract Price and Contract Times, identifies the parties and the Engineer, and designates the specific items that are Contract Documents.
 3. *Application for Payment*—The document prepared by Contractor, in a form acceptable to Engineer, to request progress or final payments, and which is to be accompanied by such supporting documentation as is required by the Contract Documents.
 4. *Bid*—The offer of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
 5. *Bidder*—An individual or entity that submits a Bid to Owner.
 6. *Bidding Documents*—The Bidding Requirements, the proposed Contract Documents, and all Addenda.
 7. *Bidding Requirements*—The Advertisement or invitation to bid, Instructions to Bidders, Bid Bond or other Bid security, if any, the Bid Form, and the Bid with any attachments.
 8. *Change Order*—A document which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, or other revision to the Contract, issued on or after the Effective Date of the Contract.
 9. *Change Proposal*—A written request by Contractor, duly submitted in compliance with the procedural requirements set forth herein, seeking an adjustment in Contract Price or Contract Times; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; challenging a set-off against payments due; or seeking other relief with respect to the terms of the Contract.
 10. *Claim*
 - a. A demand or assertion by Owner directly to Contractor, duly submitted in compliance with the procedural requirements set forth herein, seeking an adjustment of Contract Price or Contract Times; contesting an initial decision by Engineer concerning the

- requirements of the Contract Documents or the acceptability of Work under the Contract Documents; contesting Engineer's decision regarding a Change Proposal; seeking resolution of a contractual issue that Engineer has declined to address; or seeking other relief with respect to the terms of the Contract.
- b. A demand or assertion by Contractor directly to Owner, duly submitted in compliance with the procedural requirements set forth herein, contesting Engineer's decision regarding a Change Proposal, or seeking resolution of a contractual issue that Engineer has declined to address.
 - c. A demand or assertion by Owner or Contractor, duly submitted in compliance with the procedural requirements set forth herein, made pursuant to Paragraph 12.01.A.4, concerning disputes arising after Engineer has issued a recommendation of final payment.
 - d. A demand for money or services by a third party is not a Claim.
11. *Constituent of Concern*—Asbestos, petroleum, radioactive materials, polychlorinated biphenyls (PCBs), lead-based paint (as defined by the HUD/EPA standard), hazardous waste, and any substance, product, waste, or other material of any nature whatsoever that is or becomes listed, regulated, or addressed pursuant to Laws and Regulations regulating, relating to, or imposing liability or standards of conduct concerning, any hazardous, toxic, or dangerous waste, substance, or material.
 12. *Contract*—The entire and integrated written contract between Owner and Contractor concerning the Work.
 13. *Contract Documents*—Those items so designated in the Agreement, and which together comprise the Contract.
 14. *Contract Price*—The money that Owner has agreed to pay Contractor for completion of the Work in accordance with the Contract Documents.
 15. *Contract Times*—The number of days or the dates by which Contractor shall: (a) achieve Milestones, if any; (b) achieve Substantial Completion; and (c) complete the Work.
 16. *Contractor*—The individual or entity with which Owner has contracted for performance of the Work.
 17. *Cost of the Work*—See Paragraph 13.01 for definition.
 18. *Drawings*—The part of the Contract that graphically shows the scope, extent, and character of the Work to be performed by Contractor.
 19. *Effective Date of the Contract*—The date, indicated in the Agreement, on which the Contract becomes effective.
 20. *Electronic Document*—Any Project-related correspondence, attachments to correspondence, data, documents, drawings, information, or graphics, including but not limited to Shop Drawings and other Submittals, that are in an electronic or digital format.
 21. *Electronic Means*—Electronic mail (email), upload/download from a secure Project website, or other communications methods that allow: (a) the transmission or communication of Electronic Documents; (b) the documentation of transmissions, including sending and receipt; (c) printing of the transmitted Electronic Document by the

recipient; (d) the storage and archiving of the Electronic Document by sender and recipient; and (e) the use by recipient of the Electronic Document for purposes permitted by this Contract. Electronic Means does not include the use of text messaging, or of Facebook, Twitter, Instagram, or similar social media services for transmission of Electronic Documents.

22. *Engineer*—The individual or entity named as such in the Agreement.
23. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but does not change the Contract Price or the Contract Times.
24. *Hazardous Environmental Condition*—The presence at the Site of Constituents of Concern in such quantities or circumstances that may present a danger to persons or property exposed thereto.
 - a. The presence at the Site of materials that are necessary for the execution of the Work, or that are to be incorporated into the Work, and that are controlled and contained pursuant to industry practices, Laws and Regulations, and the requirements of the Contract, is not a Hazardous Environmental Condition.
 - b. The presence of Constituents of Concern that are to be removed or remediated as part of the Work is not a Hazardous Environmental Condition.
 - c. The presence of Constituents of Concern as part of the routine, anticipated, and obvious working conditions at the Site, is not a Hazardous Environmental Condition.
25. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, statutes, rules, regulations, ordinances, codes, and binding decrees, resolutions, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.
26. *Liens*—Charges, security interests, or encumbrances upon Contract-related funds, real property, or personal property.
27. *Milestone*—A principal event in the performance of the Work that the Contract requires Contractor to achieve by an intermediate completion date, or by a time prior to Substantial Completion of all the Work.
28. *Notice of Award*—The written notice by Owner to a Bidder of Owner's acceptance of the Bid.
29. *Notice to Proceed*—A written notice by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work.
30. *Owner*—The individual or entity with which Contractor has contracted regarding the Work, and which has agreed to pay Contractor for the performance of the Work, pursuant to the terms of the Contract.
31. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising Contractor's plan to accomplish the Work within the Contract Times.
32. *Project*—The total undertaking to be accomplished for Owner by engineers, contractors, and others, including planning, study, design, construction, testing, commissioning, and start-up, and of which the Work to be performed under the Contract Documents is a part.

33. *Resident Project Representative*—The authorized representative of Engineer assigned to assist Engineer at the Site. As used herein, the term Resident Project Representative (RPR) includes any assistants or field staff of Resident Project Representative.
34. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and that establish the standards by which such portion of the Work will be judged.
35. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements for Engineer's review of the submittals.
36. *Schedule of Values*—A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.
37. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information that are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work. Shop Drawings, whether approved or not, are not Drawings and are not Contract Documents.
38. *Site*—Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements, and such other lands or areas furnished by Owner which are designated for the use of Contractor.
39. *Specifications*—The part of the Contract that consists of written requirements for materials, equipment, systems, standards, and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable to the Work.
40. *Subcontractor*—An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work.
41. *Submittal*—A written or graphic document, prepared by or for Contractor, which the Contract Documents require Contractor to submit to Engineer, or that is indicated as a Submittal in the Schedule of Submittals accepted by Engineer. Submittals may include Shop Drawings and Samples; schedules; product data; Owner-delegated designs; sustainable design information; information on special procedures; testing plans; results of tests and evaluations, source quality-control testing and inspections, and field or Site quality-control testing and inspections; warranties and certifications; Suppliers' instructions and reports; records of delivery of spare parts and tools; operations and maintenance data; Project photographic documentation; record documents; and other such documents required by the Contract Documents. Submittals, whether or not approved or accepted by Engineer, are not Contract Documents. Change Proposals, Change Orders, Claims, notices, Applications for Payment, and requests for interpretation or clarification are not Submittals.
42. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion of such Work.

43. *Successful Bidder*—The Bidder to which the Owner makes an award of contract.
44. *Supplementary Conditions*—The part of the Contract that amends or supplements these General Conditions.
45. *Supplier*—A manufacturer, fabricator, supplier, distributor, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or a Subcontractor.
46. *Technical Data*
- a. Those items expressly identified as Technical Data in the Supplementary Conditions, with respect to either (1) existing subsurface conditions at or adjacent to the Site, or existing physical conditions at or adjacent to the Site including existing surface or subsurface structures (except Underground Facilities) or (2) Hazardous Environmental Conditions at the Site.
 - b. If no such express identifications of Technical Data have been made with respect to conditions at the Site, then Technical Data is defined, with respect to conditions at the Site under Paragraphs 5.03, 5.04, and 5.06, as the data contained in boring logs, recorded measurements of subsurface water levels, assessments of the condition of subsurface facilities, laboratory test results, and other factual, objective information regarding conditions at the Site that are set forth in any geotechnical, environmental, or other Site or facilities conditions report prepared for the Project and made available to Contractor.
 - c. Information and data regarding the presence or location of Underground Facilities are not intended to be categorized, identified, or defined as Technical Data, and instead Underground Facilities are shown or indicated on the Drawings.
47. *Underground Facilities*—All active or not-in-service underground lines, pipelines, conduits, ducts, encasements, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or systems at the Site, including but not limited to those facilities or systems that produce, transmit, distribute, or convey telephone or other communications, cable television, fiber optic transmissions, power, electricity, light, heat, gases, oil, crude oil products, liquid petroleum products, water, steam, waste, wastewater, storm water, other liquids or chemicals, or traffic or other control systems. An abandoned facility or system is not an Underground Facility.
48. *Unit Price Work*—Work to be paid for on the basis of unit prices.
49. *Work*—The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction; furnishing, installing, and incorporating all materials and equipment into such construction; and may include related services such as testing, start-up, and commissioning, all as required by the Contract Documents.
50. *Work Change Directive*—A written directive to Contractor issued on or after the Effective Date of the Contract, signed by Owner and recommended by Engineer, ordering an addition, deletion, or revision in the Work.

1.02 Terminology

- A. The words and terms discussed in Paragraphs 1.02.B, C, D, and E are not defined terms that require initial capital letters, but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.
- B. *Intent of Certain Terms or Adjectives:* The Contract Documents include the terms “as allowed,” “as approved,” “as ordered,” “as directed” or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives “reasonable,” “suitable,” “acceptable,” “proper,” “satisfactory,” or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Article 10 or any other provision of the Contract Documents.
- C. *Day:* The word “day” means a calendar day of 24 hours measured from midnight to the next midnight.
- D. *Defective:* The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it:
1. does not conform to the Contract Documents;
 2. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or
 3. has been damaged prior to Engineer’s recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 15.03 or Paragraph 15.04).
- E. *Furnish, Install, Perform, Provide*
1. The word “furnish,” when used in connection with services, materials, or equipment, means to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.
 2. The word “install,” when used in connection with services, materials, or equipment, means to put into use or place in final position said services, materials, or equipment complete and ready for intended use.
 3. The words “perform” or “provide,” when used in connection with services, materials, or equipment, means to furnish and install said services, materials, or equipment complete and ready for intended use.
 4. If the Contract Documents establish an obligation of Contractor with respect to specific services, materials, or equipment, but do not expressly use any of the four words “furnish,” “install,” “perform,” or “provide,” then Contractor shall furnish and install said services, materials, or equipment complete and ready for intended use.

- F. *Contract Price or Contract Times*: References to a change in “Contract Price or Contract Times” or “Contract Times or Contract Price” or similar, indicate that such change applies to (1) Contract Price, (2) Contract Times, or (3) both Contract Price and Contract Times, as warranted, even if the term “or both” is not expressed.
- G. Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2—PRELIMINARY MATTERS

2.01 *Delivery of Performance and Payment Bonds; Evidence of Insurance*

- A. *Performance and Payment Bonds*: When Contractor delivers the signed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner the performance bond and payment bond (if the Contract requires Contractor to furnish such bonds).
- B. *Evidence of Contractor’s Insurance*: When Contractor delivers the signed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner, with copies to each additional insured (as identified in the Contract), the certificates, endorsements, and other evidence of insurance required to be provided by Contractor in accordance with Article 6, except to the extent the Supplementary Conditions expressly establish other dates for delivery of specific insurance policies.
- C. *Evidence of Owner’s Insurance*: After receipt of the signed counterparts of the Agreement and all required bonds and insurance documentation, Owner shall promptly deliver to Contractor, with copies to each additional insured (as identified in the Contract), the certificates and other evidence of insurance required to be provided by Owner under Article 6.

2.02 *Copies of Documents*

- A. Owner shall furnish to Contractor four printed copies of the Contract (including one fully signed counterpart of the Agreement), and one copy in electronic portable document format (PDF). Additional printed copies will be furnished upon request at the cost of reproduction.
- B. Owner shall maintain and safeguard at least one original printed record version of the Contract, including Drawings and Specifications signed and sealed by Engineer and other design professionals. Owner shall make such original printed record version of the Contract available to Contractor for review. Owner may delegate the responsibilities under this provision to Engineer.

2.03 *Before Starting Construction*

- A. *Preliminary Schedules*: Within 10 days after the Effective Date of the Contract (or as otherwise required by the Contract Documents), Contractor shall submit to Engineer for timely review:
 - 1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract;
 - 2. a preliminary Schedule of Submittals; and
 - 3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work

into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.04 *Preconstruction Conference; Designation of Authorized Representatives*

- A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work, and to discuss the schedules referred to in Paragraph 2.03.A, procedures for handling Shop Drawings, Samples, and other Submittals, processing Applications for Payment, electronic or digital transmittals, and maintaining required records.
- B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit and receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

2.05 *Acceptance of Schedules*

- A. At least 10 days before submission of the first Application for Payment a conference, attended by Contractor, Engineer, and others as appropriate, will be held to review the schedules submitted in accordance with Paragraph 2.03.A. No progress payment will be made to Contractor until acceptable schedules are submitted to Engineer.
 - 1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.
 - 2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.
 - 3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to the component parts of the Work.
 - 4. If a schedule is not acceptable, Contractor will have an additional 10 days to revise and resubmit the schedule.

2.06 *Electronic Transmittals*

- A. Except as otherwise stated elsewhere in the Contract, the Owner, Engineer, and Contractor may send, and shall accept, Electronic Documents transmitted by Electronic Means.
- B. If the Contract does not establish protocols for Electronic Means, then Owner, Engineer, and Contractor shall jointly develop such protocols.
- C. Subject to any governing protocols for Electronic Means, when transmitting Electronic Documents by Electronic Means, the transmitting party makes no representations as to long-term compatibility, usability, or readability of the Electronic Documents resulting from the recipient's use of software application packages, operating systems, or computer hardware differing from those used in the drafting or transmittal of the Electronic Documents.

ARTICLE 3—CONTRACT DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 *Intent*

- A. The Contract Documents are complementary; what is required by one Contract Document is as binding as if required by all.
- B. It is the intent of the Contract Documents to describe a functionally complete Project (or part thereof) to be constructed in accordance with the Contract Documents.
- C. Unless otherwise stated in the Contract Documents, if there is a discrepancy between the electronic versions of the Contract Documents (including any printed copies derived from such electronic versions) and the printed record version, the printed record version will govern.
- D. The Contract supersedes prior negotiations, representations, and agreements, whether written or oral.
- E. Engineer will issue clarifications and interpretations of the Contract Documents as provided herein.
- F. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation will be deemed stricken, and all remaining provisions will continue to be valid and binding upon Owner and Contractor, which agree that the Contract Documents will be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.
- G. Nothing in the Contract Documents creates:
 1. any contractual relationship between Owner or Engineer and any Subcontractor, Supplier, or other individual or entity performing or furnishing any of the Work, for the benefit of such Subcontractor, Supplier, or other individual or entity; or
 2. any obligation on the part of Owner or Engineer to pay or to see to the payment of any money due any such Subcontractor, Supplier, or other individual or entity, except as may otherwise be required by Laws and Regulations.

3.02 *Reference Standards*

- A. *Standards Specifications, Codes, Laws and Regulations*
 1. Reference in the Contract Documents to standard specifications, manuals, reference standards, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, means the standard specification, manual, reference standard, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Contract if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.
 2. No provision of any such standard specification, manual, reference standard, or code, and no instruction of a Supplier, will be effective to change the duties or responsibilities of Owner, Contractor, or Engineer from those set forth in the part of the Contract Documents prepared by or for Engineer. No such provision or instruction shall be effective to assign to Owner or Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility

inconsistent with the provisions of the part of the Contract Documents prepared by or for Engineer.

3.03 *Reporting and Resolving Discrepancies*

A. *Reporting Discrepancies*

1. *Contractor's Verification of Figures and Field Measurements:* Before undertaking each part of the Work, Contractor shall carefully study the Contract Documents, and check and verify pertinent figures and dimensions therein, particularly with respect to applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy that Contractor discovers, or has actual knowledge of, and shall not proceed with any Work affected thereby until the conflict, error, ambiguity, or discrepancy is resolved by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract issued pursuant to Paragraph 11.01.
2. *Contractor's Review of Contract Documents:* If, before or during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) actual field conditions, (c) any standard specification, manual, reference standard, or code, or (d) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 7.15) until the conflict, error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract issued pursuant to Paragraph 11.01.
3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof.

B. *Resolving Discrepancies*

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the part of the Contract Documents prepared by or for Engineer take precedence in resolving any conflict, error, ambiguity, or discrepancy between such provisions of the Contract Documents and:
 - a. the provisions of any standard specification, manual, reference standard, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference as a Contract Document); or
 - b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 *Requirements of the Contract Documents*

- A. During the performance of the Work and until final payment, Contractor and Owner shall submit to the Engineer in writing all matters in question concerning the requirements of the Contract Documents (sometimes referred to as requests for information or interpretation—RFIs), or relating to the acceptability of the Work under the Contract Documents, as soon as possible after such matters arise. Engineer will be the initial interpreter of the requirements of the Contract Documents, and judge of the acceptability of the Work.

- B. Engineer will, with reasonable promptness, render a written clarification, interpretation, or decision on the issue submitted, or initiate an amendment or supplement to the Contract Documents. Engineer's written clarification, interpretation, or decision will be final and binding on Contractor, unless it appeals by submitting a Change Proposal, and on Owner, unless it appeals by filing a Claim.
- C. If a submitted matter in question concerns terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work under the Contract Documents, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, then Engineer will promptly notify Owner and Contractor in writing that Engineer is unable to provide a decision or interpretation. If Owner and Contractor are unable to agree on resolution of such a matter in question, either party may pursue resolution as provided in Article 12.

3.05 *Reuse of Documents*

- A. Contractor and its Subcontractors and Suppliers shall not:
 - 1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media versions, or reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer; or
 - 2. have or acquire any title or ownership rights in any other Contract Documents, reuse any such Contract Documents for any purpose without Owner's express written consent, or violate any copyrights pertaining to such Contract Documents.
- B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein precludes Contractor from retaining copies of the Contract Documents for record purposes.

ARTICLE 4—COMMENCEMENT AND PROGRESS OF THE WORK

4.01 *Commencement of Contract Times; Notice to Proceed*

- A. The Contract Times will commence to run on the 30th day after the Effective Date of the Contract or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Contract. In no event will the Contract Times commence to run later than the 60th day after the day of Bid opening or the 30th day after the Effective Date of the Contract, whichever date is earlier.

4.02 *Starting the Work*

- A. Contractor shall start to perform the Work on the date when the Contract Times commence to run. No Work may be done at the Site prior to such date.

4.03 *Reference Points*

- A. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the

established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Engineer whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

4.04 *Progress Schedule*

- A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.05 as it may be adjusted from time to time as provided below.
 - 1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.05) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times.
 - 2. Proposed adjustments in the Progress Schedule that will change the Contract Times must be submitted in accordance with the requirements of Article 11.
- B. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work will be delayed or postponed pending resolution of any disputes or disagreements, or during any appeal process, except as permitted by Paragraph 16.04, or as Owner and Contractor may otherwise agree in writing.

4.05 *Delays in Contractor's Progress*

- A. If Owner, Engineer, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times.
- B. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delay, disruption, or interference caused by or within the control of Contractor. Delay, disruption, and interference attributable to and within the control of a Subcontractor or Supplier shall be deemed to be within the control of Contractor.
- C. If Contractor's performance or progress is delayed, disrupted, or interfered with by unanticipated causes not the fault of and beyond the control of Owner, Contractor, and those for which they are responsible, then Contractor shall be entitled to an equitable adjustment in Contract Times. Such an adjustment will be Contractor's sole and exclusive remedy for the delays, disruption, and interference described in this paragraph. Causes of delay, disruption, or interference that may give rise to an adjustment in Contract Times under this paragraph include but are not limited to the following:
 - 1. Severe and unavoidable natural catastrophes such as fires, floods, epidemics, and earthquakes;
 - 2. Abnormal weather conditions;
 - 3. Acts or failures to act of third-party utility owners or other third-party entities (other than those third-party utility owners or other third-party entities performing other work at or adjacent to the Site as arranged by or under contract with Owner, as contemplated in Article 8); and
 - 4. Acts of war or terrorism.

- D. Contractor's entitlement to an adjustment of Contract Times or Contract Price is limited as follows:
1. Contractor's entitlement to an adjustment of the Contract Times is conditioned on the delay, disruption, or interference adversely affecting an activity on the critical path to completion of the Work, as of the time of the delay, disruption, or interference.
 2. Contractor shall not be entitled to an adjustment in Contract Price for any delay, disruption, or interference if such delay is concurrent with a delay, disruption, or interference caused by or within the control of Contractor. Such a concurrent delay by Contractor shall not preclude an adjustment of Contract Times to which Contractor is otherwise entitled.
 3. Adjustments of Contract Times or Contract Price are subject to the provisions of Article 11.
- E. Each Contractor request or Change Proposal seeking an increase in Contract Times or Contract Price must be supplemented by supporting data that sets forth in detail the following:
1. The circumstances that form the basis for the requested adjustment;
 2. The date upon which each cause of delay, disruption, or interference began to affect the progress of the Work;
 3. The date upon which each cause of delay, disruption, or interference ceased to affect the progress of the Work;
 4. The number of days' increase in Contract Times claimed as a consequence of each such cause of delay, disruption, or interference; and
 5. The impact on Contract Price, in accordance with the provisions of Paragraph 11.07.
- Contractor shall also furnish such additional supporting documentation as Owner or Engineer may require including, where appropriate, a revised progress schedule indicating all the activities affected by the delay, disruption, or interference, and an explanation of the effect of the delay, disruption, or interference on the critical path to completion of the Work.
- F. Delays, disruption, and interference to the performance or progress of the Work resulting from the existence of a differing subsurface or physical condition, an Underground Facility that was not shown or indicated by the Contract Documents, or not shown or indicated with reasonable accuracy, and those resulting from Hazardous Environmental Conditions, are governed by Article 5, together with the provisions of Paragraphs 4.05.D and 4.05.E.
- G. Paragraph 8.03 addresses delays, disruption, and interference to the performance or progress of the Work resulting from the performance of certain other work at or adjacent to the Site.

ARTICLE 5—SITE; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS

5.01 *Availability of Lands*

- A. Owner shall furnish the Site. Owner shall notify Contractor in writing of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work.

- B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which permanent improvements are to be made and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.
- C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

5.02 *Use of Site and Other Areas*

A. *Limitation on Use of Site and Other Areas*

1. Contractor shall confine construction equipment, temporary construction facilities, the storage of materials and equipment, and the operations of workers to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and such other adjacent areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for (a) damage to the Site; (b) damage to any such other adjacent areas used for Contractor's operations; (c) damage to any other adjacent land or areas, or to improvements, structures, utilities, or similar facilities located at such adjacent lands or areas; and (d) for injuries and losses sustained by the owners or occupants of any such land or areas; provided that such damage or injuries result from the performance of the Work or from other actions or conduct of the Contractor or those for which Contractor is responsible.
 2. If a damage or injury claim is made by the owner or occupant of any such land or area because of the performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible, Contractor shall (a) take immediate corrective or remedial action as required by Paragraph 7.13, or otherwise; (b) promptly attempt to settle the claim as to all parties through negotiations with such owner or occupant, or otherwise resolve the claim by arbitration or other dispute resolution proceeding, or in a court of competent jurisdiction; and (c) to the fullest extent permitted by Laws and Regulations, indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, from and against any such claim, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused directly or indirectly, in whole or in part by, or based upon, Contractor's performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible.
- B. *Removal of Debris During Performance of the Work:* During the progress of the Work the Contractor shall keep the Site and other adjacent areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris will conform to applicable Laws and Regulations.
 - C. *Cleaning:* Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site and adjacent areas all tools, appliances, construction equipment

and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.

- D. *Loading of Structures*: Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent structures or land to stresses or pressures that will endanger them.

5.03 *Subsurface and Physical Conditions*

- A. *Reports and Drawings*: The Supplementary Conditions identify:

1. Those reports of explorations and tests of subsurface conditions at or adjacent to the Site that contain Technical Data;
2. Those drawings of existing physical conditions at or adjacent to the Site, including those drawings depicting existing surface or subsurface structures at or adjacent to the Site (except Underground Facilities), that contain Technical Data; and
3. Technical Data contained in such reports and drawings.

- B. *Underground Facilities*: Underground Facilities are shown or indicated on the Drawings, pursuant to Paragraph 5.05, and not in the drawings referred to in Paragraph 5.03.A. Information and data regarding the presence or location of Underground Facilities are not intended to be categorized, identified, or defined as Technical Data.

- C. *Reliance by Contractor on Technical Data*: Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely upon the accuracy of the Technical Data as defined in Paragraph 1.01.A.46.b.

- D. *Limitations of Other Data and Documents*: Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:
1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto;
 2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings;
 3. the contents of other Site-related documents made available to Contractor, such as record drawings from other projects at or adjacent to the Site, or Owner's archival documents concerning the Site; or
 4. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions, or information.

5.04 *Differing Subsurface or Physical Conditions*

- A. *Notice by Contractor:* If Contractor believes that any subsurface or physical condition that is uncovered or revealed at the Site:
1. is of such a nature as to establish that any Technical Data on which Contractor is entitled to rely as provided in Paragraph 5.03 is materially inaccurate;
 2. is of such a nature as to require a change in the Drawings or Specifications;
 3. differs materially from that shown or indicated in the Contract Documents; or
 4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except with respect to an emergency) until receipt of a written statement permitting Contractor to do so.

- B. *Engineer's Review:* After receipt of written notice as required by the preceding paragraph, Engineer will promptly review the subsurface or physical condition in question; determine whether it is necessary for Owner to obtain additional exploration or tests with respect to the condition; conclude whether the condition falls within any one or more of the differing site condition categories in Paragraph 5.04.A; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the subsurface or physical condition in question and the need for any change in the Drawings or Specifications; and advise Owner in writing of Engineer's findings, conclusions, and recommendations.
- C. *Owner's Statement to Contractor Regarding Site Condition:* After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the subsurface or physical condition in question, addressing the resumption of Work in connection with such condition, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations, in whole or in part.
- D. *Early Resumption of Work:* If at any time Engineer determines that Work in connection with the subsurface or physical condition in question may resume prior to completion of Engineer's review or Owner's issuance of its statement to Contractor, because the condition in question has been adequately documented, and analyzed on a preliminary basis, then the Engineer may at its discretion instruct Contractor to resume such Work.
- E. *Possible Price and Times Adjustments*
1. Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times, to the extent that the existence of a differing subsurface or physical condition, or any related delay, disruption, or interference, causes an increase or decrease in

Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

- a. Such condition must fall within any one or more of the categories described in Paragraph 5.04.A;
 - b. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03; and,
 - c. Contractor's entitlement to an adjustment of the Contract Times is subject to the provisions of Paragraphs 4.05.D and 4.05.E.
2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times with respect to a subsurface or physical condition if:
- a. Contractor knew of the existence of such condition at the time Contractor made a commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract, or otherwise;
 - b. The existence of such condition reasonably could have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas expressly required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such commitment; or
 - c. Contractor failed to give the written notice required by Paragraph 5.04.A.
3. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, then any such adjustment will be set forth in a Change Order.
4. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the subsurface or physical condition in question.
- F. *Underground Facilities; Hazardous Environmental Conditions:* Paragraph 5.05 governs rights and responsibilities regarding the presence or location of Underground Facilities. Paragraph 5.06 governs rights and responsibilities regarding Hazardous Environmental Conditions. The provisions of Paragraphs 5.03 and 5.04 are not applicable to the presence or location of Underground Facilities, or to Hazardous Environmental Conditions.

5.05 *Underground Facilities*

- A. *Contractor's Responsibilities:* Unless it is otherwise expressly provided in the Supplementary Conditions, the cost of all of the following are included in the Contract Price, and Contractor shall have full responsibility for:
1. reviewing and checking all information and data regarding existing Underground Facilities at the Site;
 2. complying with applicable state and local utility damage prevention Laws and Regulations;

3. verifying the actual location of those Underground Facilities shown or indicated in the Contract Documents as being within the area affected by the Work, by exposing such Underground Facilities during the course of construction;
 4. coordination of the Work with the owners (including Owner) of such Underground Facilities, during construction; and
 5. the safety and protection of all existing Underground Facilities at the Site, and repairing any damage thereto resulting from the Work.
- B. *Notice by Contractor:* If Contractor believes that an Underground Facility that is uncovered or revealed at the Site was not shown or indicated on the Drawings, or was not shown or indicated on the Drawings with reasonable accuracy, then Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), notify Owner and Engineer in writing regarding such Underground Facility.
- C. *Engineer's Review:* Engineer will:
1. promptly review the Underground Facility and conclude whether such Underground Facility was not shown or indicated on the Drawings, or was not shown or indicated with reasonable accuracy;
 2. identify and communicate with the owner of the Underground Facility; prepare recommendations to Owner (and if necessary issue any preliminary instructions to Contractor) regarding the Contractor's resumption of Work in connection with the Underground Facility in question;
 3. obtain any pertinent cost or schedule information from Contractor; determine the extent, if any, to which a change is required in the Drawings or Specifications to reflect and document the consequences of the existence or location of the Underground Facility; and
 4. advise Owner in writing of Engineer's findings, conclusions, and recommendations.
- During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.
- D. *Owner's Statement to Contractor Regarding Underground Facility:* After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the Underground Facility in question addressing the resumption of Work in connection with such Underground Facility, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations in whole or in part.
- E. *Early Resumption of Work:* If at any time Engineer determines that Work in connection with the Underground Facility may resume prior to completion of Engineer's review or Owner's issuance of its statement to Contractor, because the Underground Facility in question and conditions affected by its presence have been adequately documented, and analyzed on a preliminary basis, then the Engineer may at its discretion instruct Contractor to resume such Work.
- F. *Possible Price and Times Adjustments*
1. Contractor shall be entitled to an equitable adjustment in the Contract Price or Contract Times, to the extent that any existing Underground Facility at the Site that was not shown

or indicated on the Drawings, or was not shown or indicated with reasonable accuracy, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

- a. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03;
 - b. Contractor's entitlement to an adjustment of the Contract Times is subject to the provisions of Paragraphs 4.05.D and 4.05.E; and
 - c. Contractor gave the notice required in Paragraph 5.05.B.
2. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, then any such adjustment will be set forth in a Change Order.
 3. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the Underground Facility in question.
 4. The information and data shown or indicated on the Drawings with respect to existing Underground Facilities at the Site is based on information and data (a) furnished by the owners of such Underground Facilities, or by others, (b) obtained from available records, or (c) gathered in an investigation conducted in accordance with the current edition of ASCE 38, Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data, by the American Society of Civil Engineers. If such information or data is incorrect or incomplete, Contractor's remedies are limited to those set forth in this Paragraph 5.05.F.

5.06 *Hazardous Environmental Conditions at Site*

A. *Reports and Drawings:* The Supplementary Conditions identify:

1. those reports known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site;
2. drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site; and
3. Technical Data contained in such reports and drawings.

B. *Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely on the accuracy of the Technical Data as defined in Paragraph 1.01.A.46.b. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures

- of construction to be employed by Contractor, and safety precautions and programs incident thereto;
2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or
 3. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions or information.
- C. Contractor shall not be responsible for removing or remediating any Hazardous Environmental Condition encountered, uncovered, or revealed at the Site unless such removal or remediation is expressly identified in the Contract Documents to be within the scope of the Work.
- D. Contractor shall be responsible for controlling, containing, and duly removing all Constituents of Concern brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible, and for any associated costs; and for the costs of removing and remediating any Hazardous Environmental Condition created by the presence of any such Constituents of Concern.
- E. If Contractor encounters, uncovers, or reveals a Hazardous Environmental Condition whose removal or remediation is not expressly identified in the Contract Documents as being within the scope of the Work, or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, then Contractor shall immediately: (1) secure or otherwise isolate such condition; (2) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 7.15); and (3) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 5.06.F. If Contractor or anyone for whom Contractor is responsible created the Hazardous Environmental Condition in question, then Owner may remove and remediate the Hazardous Environmental Condition, and impose a set-off against payments to account for the associated costs.
- F. Contractor shall not resume Work in connection with such Hazardous Environmental Condition or in any affected area until after Owner has obtained any required permits related thereto, and delivered written notice to Contractor either (1) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work, or (2) specifying any special conditions under which such Work may be resumed safely.
- G. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, as a result of such Work stoppage, such special conditions under which Work is agreed to be resumed by Contractor, or any costs or expenses incurred in response to the Hazardous Environmental Condition, then within 30 days of Owner's written notice regarding the resumption of Work, Contractor may submit a Change Proposal, or Owner may impose a set-off. Entitlement to any such adjustment is subject to the provisions of Paragraphs 4.05.D, 4.05.E, 11.07, and 11.08.
- H. If, after receipt of such written notice, Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special

conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work, following the contractual change procedures in Article 11. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 8.

- I. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court, arbitration, or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition (1) was not shown or indicated in the Drawings, Specifications, or other Contract Documents, identified as Technical Data entitled to limited reliance pursuant to Paragraph 5.06.B, or identified in the Contract Documents to be included within the scope of the Work, and (2) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.I obligates Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- J. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the failure to control, contain, or remove a Constituent of Concern brought to the Site by Contractor or by anyone for whom Contractor is responsible, or to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.J obligates Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- K. The provisions of Paragraphs 5.03, 5.04, and 5.05 do not apply to the presence of Constituents of Concern or to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 6—BONDS AND INSURANCE

6.01 *Performance, Payment, and Other Bonds*

- A. Contractor shall furnish a performance bond and a payment bond, each in an amount at least equal to the Contract Price, as security for the faithful performance and payment of Contractor's obligations under the Contract. These bonds must remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 15.08, whichever is later, except as provided otherwise by Laws or Regulations, the terms of a prescribed bond form, the Supplementary Conditions, or other provisions of the Contract.
- B. Contractor shall also furnish such other bonds (if any) as are required by the Supplementary Conditions or other provisions of the Contract.
- C. All bonds must be in the form included in the Bidding Documents or otherwise specified by Owner prior to execution of the Contract, except as provided otherwise by Laws or

Regulations, and must be issued and signed by a surety named in "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Department Circular 570 (as amended and supplemented) by the Bureau of the Fiscal Service, U.S. Department of the Treasury. A bond signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority must show that it is effective on the date the agent or attorney-in-fact signed the accompanying bond.

- D. Contractor shall obtain the required bonds from surety companies that are duly licensed or authorized, in the state or jurisdiction in which the Project is located, to issue bonds in the required amounts.
- E. If the surety on a bond furnished by Contractor is declared bankrupt or becomes insolvent, or the surety ceases to meet the requirements above, then Contractor shall promptly notify Owner and Engineer in writing and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which must comply with the bond and surety requirements above.
- F. If Contractor has failed to obtain a required bond, Owner may exclude the Contractor from the Site and exercise Owner's termination rights under Article 16.
- G. Upon request to Owner from any Subcontractor, Supplier, or other person or entity claiming to have furnished labor, services, materials, or equipment used in the performance of the Work, Owner shall provide a copy of the payment bond to such person or entity.
- H. Upon request to Contractor from any Subcontractor, Supplier, or other person or entity claiming to have furnished labor, services, materials, or equipment used in the performance of the Work, Contractor shall provide a copy of the payment bond to such person or entity.

6.02 *Insurance—General Provisions*

- A. Owner and Contractor shall obtain and maintain insurance as required in this article and in the Supplementary Conditions.
- B. All insurance required by the Contract to be purchased and maintained by Owner or Contractor shall be obtained from insurance companies that are duly licensed or authorized in the state or jurisdiction in which the Project is located to issue insurance policies for the required limits and coverages. Unless a different standard is indicated in the Supplementary Conditions, all companies that provide insurance policies required under this Contract shall have an A.M. Best rating of A-VII or better.
- C. Alternative forms of insurance coverage, including but not limited to self-insurance and "Occupational Accident and Excess Employer's Indemnity Policies," are not sufficient to meet the insurance requirements of this Contract, unless expressly allowed in the Supplementary Conditions.
- D. Contractor shall deliver to Owner, with copies to each additional insured identified in the Contract, certificates of insurance and endorsements establishing that Contractor has obtained and is maintaining the policies and coverages required by the Contract. Upon request by Owner or any other insured, Contractor shall also furnish other evidence of such required insurance, including but not limited to copies of policies, documentation of applicable self-insured retentions (if allowed) and deductibles, full disclosure of all relevant exclusions, and evidence of insurance required to be purchased and maintained by

Subcontractors or Suppliers. In any documentation furnished under this provision, Contractor, Subcontractors, and Suppliers may block out (redact) (1) any confidential premium or pricing information and (2) any wording specific to a project or jurisdiction other than those applicable to this Contract.

- E. Owner shall deliver to Contractor, with copies to each additional insured identified in the Contract, certificates of insurance and endorsements establishing that Owner has obtained and is maintaining the policies and coverages required of Owner by the Contract (if any). Upon request by Contractor or any other insured, Owner shall also provide other evidence of such required insurance (if any), including but not limited to copies of policies, documentation of applicable self-insured retentions (if allowed) and deductibles, and full disclosure of all relevant exclusions. In any documentation furnished under this provision, Owner may block out (redact) (1) any confidential premium or pricing information and (2) any wording specific to a project or jurisdiction other than those relevant to this Contract.
- F. Failure of Owner or Contractor to demand such certificates or other evidence of the other party's full compliance with these insurance requirements, or failure of Owner or Contractor to identify a deficiency in compliance from the evidence provided, will not be construed as a waiver of the other party's obligation to obtain and maintain such insurance.
- G. In addition to the liability insurance required to be provided by Contractor, the Owner, at Owner's option, may purchase and maintain Owner's own liability insurance. Owner's liability policies, if any, operate separately and independently from policies required to be provided by Contractor, and Contractor cannot rely upon Owner's liability policies for any of Contractor's obligations to the Owner, Engineer, or third parties.
- H. Contractor shall require:
 - 1. Subcontractors to purchase and maintain worker's compensation, commercial general liability, and other insurance that is appropriate for their participation in the Project, and to name as additional insureds Owner and Engineer (and any other individuals or entities identified in the Supplementary Conditions as additional insureds on Contractor's liability policies) on each Subcontractor's commercial general liability insurance policy; and
 - 2. Suppliers to purchase and maintain insurance that is appropriate for their participation in the Project.
- I. If either party does not purchase or maintain the insurance required of such party by the Contract, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage.
- J. If Contractor has failed to obtain and maintain required insurance, Contractor's entitlement to enter or remain at the Site will end immediately, and Owner may impose an appropriate set-off against payment for any associated costs (including but not limited to the cost of purchasing necessary insurance coverage), and exercise Owner's termination rights under Article 16.
- K. Without prejudice to any other right or remedy, if a party has failed to obtain required insurance, the other party may elect (but is in no way obligated) to obtain equivalent insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and the Contract Price will be adjusted accordingly.

- L. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor or Contractor's interests. Contractor is responsible for determining whether such coverage and limits are adequate to protect its interests, and for obtaining and maintaining any additional insurance that Contractor deems necessary.
- M. The insurance and insurance limits required herein will not be deemed as a limitation on Contractor's liability, or that of its Subcontractors or Suppliers, under the indemnities granted to Owner and other individuals and entities in the Contract or otherwise.
- N. All the policies of insurance required to be purchased and maintained under this Contract will contain a provision or endorsement that the coverage afforded will not be canceled, or renewal refused, until at least 10 days prior written notice has been given to the purchasing policyholder. Within three days of receipt of any such written notice, the purchasing policyholder shall provide a copy of the notice to each other insured and Engineer.

6.03 *Contractor's Insurance*

- A. *Required Insurance:* Contractor shall purchase and maintain Worker's Compensation, Commercial General Liability, and other insurance pursuant to the specific requirements of the Supplementary Conditions.
- B. *General Provisions:* The policies of insurance required by this Paragraph 6.03 as supplemented must:
 - 1. include at least the specific coverages required;
 - 2. be written for not less than the limits provided, or those required by Laws or Regulations, whichever is greater;
 - 3. remain in effect at least until the Work is complete (as set forth in Paragraph 15.06.D), and longer if expressly required elsewhere in this Contract, and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work as a warranty or correction obligation, or otherwise, or returning to the Site to conduct other tasks arising from the Contract;
 - 4. apply with respect to the performance of the Work, whether such performance is by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable; and
 - 5. include all necessary endorsements to support the stated requirements.
- C. *Additional Insureds:* The Contractor's commercial general liability, automobile liability, employer's liability, umbrella or excess, pollution liability, and unmanned aerial vehicle liability policies, if required by this Contract, must:
 - 1. include and list as additional insureds Owner and Engineer, and any individuals or entities identified as additional insureds in the Supplementary Conditions;
 - 2. include coverage for the respective officers, directors, members, partners, employees, and consultants of all such additional insureds;
 - 3. afford primary coverage to these additional insureds for all claims covered thereby (including as applicable those arising from both ongoing and completed operations);

4. not seek contribution from insurance maintained by the additional insured; and
5. as to commercial general liability insurance, apply to additional insureds with respect to liability caused in whole or in part by Contractor's acts or omissions, or the acts and omissions of those working on Contractor's behalf, in the performance of Contractor's operations.

6.04 *Builder's Risk and Other Property Insurance*

- A. *Builder's Risk:* Unless otherwise provided in the Supplementary Conditions, Contractor shall purchase and maintain builder's risk insurance upon the Work on a completed value basis, in the amount of the Work's full insurable replacement cost (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). The specific requirements applicable to the builder's risk insurance are set forth in the Supplementary Conditions.
- B. *Property Insurance for Facilities of Owner Where Work Will Occur:* Owner is responsible for obtaining and maintaining property insurance covering each existing structure, building, or facility in which any part of the Work will occur, or to which any part of the Work will attach or be adjoined. Such property insurance will be written on a special perils (all-risk) form, on a replacement cost basis, providing coverage consistent with that required for the builder's risk insurance, and will be maintained until the Work is complete, as set forth in Paragraph 15.06.D.
- C. *Property Insurance for Substantially Complete Facilities:* Promptly after Substantial Completion, and before actual occupancy or use of the substantially completed Work, Owner will obtain property insurance for such substantially completed Work, and maintain such property insurance at least until the Work is complete, as set forth in Paragraph 15.06.D. Such property insurance will be written on a special perils (all-risk) form, on a replacement cost basis, and provide coverage consistent with that required for the builder's risk insurance. The builder's risk insurance may terminate upon written confirmation of Owner's procurement of such property insurance.
- D. *Partial Occupancy or Use by Owner:* If Owner will occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work, as provided in Paragraph 15.04, then Owner (directly, if it is the purchaser of the builder's risk policy, or through Contractor) will provide advance notice of such occupancy or use to the builder's risk insurer, and obtain an endorsement consenting to the continuation of coverage prior to commencing such partial occupancy or use.
- E. *Insurance of Other Property; Additional Insurance:* If the express insurance provisions of the Contract do not require or address the insurance of a property item or interest, then the entity or individual owning such property item will be responsible for insuring it. If Contractor elects to obtain other special insurance to be included in or supplement the builder's risk or property insurance policies provided under this Paragraph 6.04, it may do so at Contractor's expense.

6.05 *Property Losses; Subrogation*

- A. The builder's risk insurance policy purchased and maintained in accordance with Paragraph 6.04 (or an installation floater policy if authorized by the Supplementary Conditions), will contain provisions to the effect that in the event of payment of any loss or damage the insurer will have no rights of recovery against any insureds thereunder, or against

Engineer or its consultants, or their officers, directors, members, partners, employees, agents, consultants, or subcontractors.

1. Owner and Contractor waive all rights against each other and the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from any of the perils, risks, or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Engineer, its consultants, all individuals or entities identified in the Supplementary Conditions as builder's risk or installation floater insureds, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, under such policies for losses and damages so caused.
 2. None of the above waivers extends to the rights that any party making such waiver may have to the proceeds of insurance held by Owner or Contractor as trustee or fiduciary, or otherwise payable under any policy so issued.
- B. Any property insurance policy maintained by Owner covering any loss, damage, or consequential loss to Owner's existing structures, buildings, or facilities in which any part of the Work will occur, or to which any part of the Work will attach or adjoin; to adjacent structures, buildings, or facilities of Owner; or to part or all of the completed or substantially completed Work, during partial occupancy or use pursuant to Paragraph 15.04, after Substantial Completion pursuant to Paragraph 15.03, or after final payment pursuant to Paragraph 15.06, will contain provisions to the effect that in the event of payment of any loss or damage the insurer will have no rights of recovery against any insureds thereunder, or against Contractor, Subcontractors, or Engineer, or the officers, directors, members, partners, employees, agents, consultants, or subcontractors of each and any of them, and that the insured is allowed to waive the insurer's rights of subrogation in a written contract executed prior to the loss, damage, or consequential loss.
1. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from fire or any of the perils, risks, or causes of loss covered by such policies.
- C. The waivers in this Paragraph 6.05 include the waiver of rights due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other insured peril, risk, or cause of loss.
- D. Contractor shall be responsible for assuring that each Subcontract contains provisions whereby the Subcontractor waives all rights against Owner, Contractor, all individuals or entities identified in the Supplementary Conditions as insureds, the Engineer and its consultants, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, relating to, or resulting from fire or other peril, risk, or cause of loss covered by builder's risk insurance, installation floater, and any other property insurance applicable to the Work.

6.06 *Receipt and Application of Property Insurance Proceeds*

- A. Any insured loss under the builder's risk and other policies of property insurance required by Paragraph 6.04 will be adjusted and settled with the named insured that purchased the policy. Such named insured shall act as fiduciary for the other insureds, and give notice to such other insureds that adjustment and settlement of a claim is in progress. Any other insured may state its position regarding a claim for insured loss in writing within 15 days after notice of such claim.
- B. Proceeds for such insured losses may be made payable by the insurer either jointly to multiple insureds, or to the named insured that purchased the policy in its own right and as fiduciary for other insureds, subject to the requirements of any applicable mortgage clause. A named insured receiving insurance proceeds under the builder's risk and other policies of insurance required by Paragraph 6.04 shall maintain such proceeds in a segregated account, and distribute such proceeds in accordance with such agreement as the parties in interest may reach, or as otherwise required under the dispute resolution provisions of this Contract or applicable Laws and Regulations.
- C. If no other special agreement is reached, Contractor shall repair or replace the damaged Work, using allocated insurance proceeds.

ARTICLE 7—CONTRACTOR'S RESPONSIBILITIES

7.01 *Contractor's Means and Methods of Construction*

- A. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction.
- B. If the Contract Documents note, or Contractor determines, that professional engineering or other design services are needed to carry out Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures, or for Site safety, then Contractor shall cause such services to be provided by a properly licensed design professional, at Contractor's expense. Such services are not Owner-delegated professional design services under this Contract, and neither Owner nor Engineer has any responsibility with respect to (1) Contractor's determination of the need for such services, (2) the qualifications or licensing of the design professionals retained or employed by Contractor, (3) the performance of such services, or (4) any errors, omissions, or defects in such services.

7.02 *Supervision and Superintendence*

- A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents.
- B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who will not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

7.03 *Labor; Working Hours*

- A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall maintain good discipline and order at the Site.

- B. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of Contractor's employees; of Suppliers and Subcontractors, and their employees; and of any other individuals or entities performing or furnishing any of the Work, just as Contractor is responsible for Contractor's own acts and omissions.
- C. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site will be performed during regular working hours, Monday through Friday. Contractor will not perform Work on a Saturday, Sunday, or any legal holiday. Contractor may perform Work outside regular working hours or on Saturdays, Sundays, or legal holidays only with Owner's written consent, which will not be unreasonably withheld.

7.04 *Services, Materials, and Equipment*

- A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start up, and completion of the Work, whether or not such items are specifically called for in the Contract Documents.
- B. All materials and equipment incorporated into the Work must be new and of good quality, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications will expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.
- C. All materials and equipment must be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

7.05 *"Or Equals"*

- A. *Contractor's Request; Governing Criteria:* Whenever an item of equipment or material is specified or described in the Contract Documents by using the names of one or more proprietary items or specific Suppliers, the Contract Price has been based upon Contractor furnishing such item as specified. The specification or description of such an item is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or equal" item is permitted, Contractor may request that Engineer authorize the use of other items of equipment or material, or items from other proposed Suppliers, under the circumstances described below.
 - 1. If Engineer in its sole discretion determines that an item of equipment or material proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, Engineer will deem it an "or equal" item. For the purposes of this paragraph, a proposed item of equipment or material will be considered functionally equal to an item so named if:
 - a. in the exercise of reasonable judgment Engineer determines that the proposed item:
 - 1) is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;

- 2) will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole;
 - 3) has a proven record of performance and availability of responsive service; and
 - 4) is not objectionable to Owner.
- b. Contractor certifies that, if the proposed item is approved and incorporated into the Work:
- 1) there will be no increase in cost to the Owner or increase in Contract Times; and
 - 2) the item will conform substantially to the detailed requirements of the item named in the Contract Documents.
- B. *Contractor's Expense*: Contractor shall provide all data in support of any proposed "or equal" item at Contractor's expense.
- C. *Engineer's Evaluation and Determination*: Engineer will be allowed a reasonable time to evaluate each "or-equal" request. Engineer may require Contractor to furnish additional data about the proposed "or-equal" item. Engineer will be the sole judge of acceptability. No "or-equal" item will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an "or-equal," which will be evidenced by an approved Shop Drawing or other written communication. Engineer will advise Contractor in writing of any negative determination.
- D. *Effect of Engineer's Determination*: Neither approval nor denial of an "or-equal" request will result in any change in Contract Price. The Engineer's denial of an "or-equal" request will be final and binding, and may not be reversed through an appeal under any provision of the Contract.
- E. *Treatment as a Substitution Request*: If Engineer determines that an item of equipment or material proposed by Contractor does not qualify as an "or-equal" item, Contractor may request that Engineer consider the item a proposed substitute pursuant to Paragraph 7.06.

7.06 Substitutes

- A. *Contractor's Request; Governing Criteria*: Unless the specification or description of an item of equipment or material required to be furnished under the Contract Documents contains or is followed by words reading that no substitution is permitted, Contractor may request that Engineer authorize the use of other items of equipment or material under the circumstances described below. To the extent possible such requests must be made before commencement of related construction at the Site.
1. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is functionally equivalent to that named and an acceptable substitute therefor. Engineer will not accept requests for review of proposed substitute items of equipment or material from anyone other than Contractor.
 2. The requirements for review by Engineer will be as set forth in Paragraph 7.06.B, as supplemented by the Specifications, and as Engineer may decide is appropriate under the circumstances.

3. Contractor shall make written application to Engineer for review of a proposed substitute item of equipment or material that Contractor seeks to furnish or use. The application:
 - a. will certify that the proposed substitute item will:
 - 1) perform adequately the functions and achieve the results called for by the general design;
 - 2) be similar in substance to the item specified; and
 - 3) be suited to the same use as the item specified.
 - b. will state:
 - 1) the extent, if any, to which the use of the proposed substitute item will necessitate a change in Contract Times;
 - 2) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item; and
 - 3) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty.
 - c. will identify:
 - 1) all variations of the proposed substitute item from the item specified; and
 - 2) available engineering, sales, maintenance, repair, and replacement services.
 - d. will contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including but not limited to changes in Contract Price, shared savings, costs of redesign, and claims of other contractors affected by any resulting change.
- B. *Engineer's Evaluation and Determination:* Engineer will be allowed a reasonable time to evaluate each substitute request, and to obtain comments and direction from Owner. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No substitute will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an acceptable substitute. Engineer's determination will be evidenced by a Field Order or a proposed Change Order accounting for the substitution itself and all related impacts, including changes in Contract Price or Contract Times. Engineer will advise Contractor in writing of any negative determination.
- C. *Special Guarantee:* Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.
- D. *Reimbursement of Engineer's Cost:* Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.

- E. *Contractor's Expense*: Contractor shall provide all data in support of any proposed substitute at Contractor's expense.
- F. *Effect of Engineer's Determination*: If Engineer approves the substitution request, Contractor shall execute the proposed Change Order and proceed with the substitution. The Engineer's denial of a substitution request will be final and binding, and may not be reversed through an appeal under any provision of the Contract. Contractor may challenge the scope of reimbursement costs imposed under Paragraph 7.06.D, by timely submittal of a Change Proposal.

7.07 *Concerning Subcontractors and Suppliers*

- A. Contractor may retain Subcontractors and Suppliers for the performance of parts of the Work. Such Subcontractors and Suppliers must be acceptable to Owner. The Contractor's retention of a Subcontractor or Supplier for the performance of parts of the Work will not relieve Contractor's obligation to Owner to perform and complete the Work in accordance with the Contract Documents.
- B. Contractor shall retain specific Subcontractors and Suppliers for the performance of designated parts of the Work if required by the Contract to do so.
- C. Subsequent to the submittal of Contractor's Bid or final negotiation of the terms of the Contract, Owner may not require Contractor to retain any Subcontractor or Supplier to furnish or perform any of the Work against which Contractor has reasonable objection.
- D. Prior to entry into any binding subcontract or purchase order, Contractor shall submit to Owner the identity of the proposed Subcontractor or Supplier (unless Owner has already deemed such proposed Subcontractor or Supplier acceptable during the bidding process or otherwise). Such proposed Subcontractor or Supplier shall be deemed acceptable to Owner unless Owner raises a substantive, reasonable objection within 5 days.
- E. Owner may require the replacement of any Subcontractor or Supplier. Owner also may require Contractor to retain specific replacements; provided, however, that Owner may not require a replacement to which Contractor has a reasonable objection. If Contractor has submitted the identity of certain Subcontractors or Suppliers for acceptance by Owner, and Owner has accepted it (either in writing or by failing to make written objection thereto), then Owner may subsequently revoke the acceptance of any such Subcontractor or Supplier so identified solely on the basis of substantive, reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor or Supplier.
- F. If Owner requires the replacement of any Subcontractor or Supplier retained by Contractor to perform any part of the Work, then Contractor shall be entitled to an adjustment in Contract Price or Contract Times, with respect to the replacement; and Contractor shall initiate a Change Proposal for such adjustment within 30 days of Owner's requirement of replacement.
- G. No acceptance by Owner of any such Subcontractor or Supplier, whether initially or as a replacement, will constitute a waiver of the right of Owner to the completion of the Work in accordance with the Contract Documents.

- H. On a monthly basis, Contractor shall submit to Engineer a complete list of all Subcontractors and Suppliers having a direct contract with Contractor, and of all other Subcontractors and Suppliers known to Contractor at the time of submittal.
- I. Contractor shall be solely responsible for scheduling and coordinating the work of Subcontractors and Suppliers.
- J. The divisions and sections of the Specifications and the identifications of any Drawings do not control Contractor in dividing the Work among Subcontractors or Suppliers, or in delineating the Work to be performed by any specific trade.
- K. All Work performed for Contractor by a Subcontractor or Supplier must be pursuant to an appropriate contractual agreement that specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract for the benefit of Owner and Engineer.
- L. Owner may furnish to any Subcontractor or Supplier, to the extent practicable, information about amounts paid to Contractor for Work performed for Contractor by the Subcontractor or Supplier.
- M. Contractor shall restrict all Subcontractors and Suppliers from communicating with Engineer or Owner, except through Contractor or in case of an emergency, or as otherwise expressly allowed in this Contract.

7.08 *Patent Fees and Royalties*

- A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If an invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if, to the actual knowledge of Owner or Engineer, its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights will be disclosed in the Contract Documents.
- B. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, and its officers, directors, members, partners, employees, agents, consultants, and subcontractors, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device specified in the Contract Documents, but not identified as being subject to payment of any license fee or royalty to others required by patent rights or copyrights.
- C. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

7.09 *Permits*

- A. Unless otherwise provided in the Contract Documents, Contractor shall obtain and pay for all construction permits, licenses, and certificates of occupancy. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of the submission of Contractor's Bid (or when Contractor became bound under a negotiated contract). Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.

7.10 *Taxes*

- A. Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by Contractor in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

7.11 *Laws and Regulations*

- A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.
- B. If Contractor performs any Work or takes any other action knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all resulting costs and losses, and shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work or other action. It is not Contractor's responsibility to make certain that the Work described in the Contract Documents is in accordance with Laws and Regulations, but this does not relieve Contractor of its obligations under Paragraph 3.03.
- C. Owner or Contractor may give written notice to the other party of any changes after the submission of Contractor's Bid (or after the date when Contractor became bound under a negotiated contract) in Laws or Regulations having an effect on the cost or time of performance of the Work, including but not limited to changes in Laws or Regulations having an effect on procuring permits and on sales, use, value-added, consumption, and other similar taxes. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times resulting from such changes, then within 30 days of such written notice Contractor may submit a Change Proposal, or Owner may initiate a Claim.

7.12 *Record Documents*

- A. Contractor shall maintain in a safe place at the Site one printed record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, written interpretations and clarifications, and approved Shop Drawings. Contractor shall keep such record documents in good order and annotate them to show changes made during construction. These record documents, together with all approved Samples, will be available to Engineer for reference. Upon completion of the Work, Contractor shall deliver these record documents to Engineer.

7.13 *Safety and Protection*

- A. Contractor shall be solely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations.
- B. Contractor shall designate a qualified and experienced safety representative whose duties and responsibilities are the prevention of Work-related accidents and the maintenance and supervision of safety precautions and programs.
- C. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury, or loss to:
 - 1. all persons on the Site or who may be affected by the Work;
 - 2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
 - 3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, other work in progress, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.
- D. All damage, injury, or loss to any property referred to in Paragraph 7.13.C.2 or 7.13.C.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor at its expense (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).
- E. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection.
- F. Contractor shall notify Owner; the owners of adjacent property; the owners of Underground Facilities and other utilities (if the identity of such owners is known to Contractor); and other contractors and utility owners performing work at or adjacent to the Site, in writing, when Contractor knows that prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property or work in progress.
- G. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. Any Owner's safety programs that are applicable to the Work are identified or included in the Supplementary Conditions or Specifications.
- H. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.

- I. Contractor's duties and responsibilities for safety and protection will continue until all the Work is completed, Engineer has issued a written notice to Owner and Contractor in accordance with Paragraph 15.06.C that the Work is acceptable, and Contractor has left the Site (except as otherwise expressly provided in connection with Substantial Completion).
- J. Contractor's duties and responsibilities for safety and protection will resume whenever Contractor or any Subcontractor or Supplier returns to the Site to fulfill warranty or correction obligations, or to conduct other tasks arising from the Contract Documents.

7.14 *Hazard Communication Programs*

- A. Contractor shall be responsible for coordinating any exchange of safety data sheets (formerly known as material safety data sheets) or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with Laws or Regulations.

7.15 *Emergencies*

- A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused by an emergency, or are required as a result of Contractor's response to an emergency. If Engineer determines that a change in the Contract Documents is required because of an emergency or Contractor's response, a Work Change Directive or Change Order will be issued.

7.16 *Submittals*

A. *Shop Drawing and Sample Requirements*

- 1. Before submitting a Shop Drawing or Sample, Contractor shall:
 - a. review and coordinate the Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;
 - b. determine and verify:
 - 1) all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect to the Submittal;
 - 2) the suitability of all materials and equipment offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and
 - 3) all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto;
 - c. confirm that the Submittal is complete with respect to all related data included in the Submittal.
- 2. Each Shop Drawing or Sample must bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review of that Submittal, and that Contractor approves the Submittal.

3. With each Shop Drawing or Sample, Contractor shall give Engineer specific written notice of any variations that the Submittal may have from the requirements of the Contract Documents. This notice must be set forth in a written communication separate from the Submittal; and, in addition, in the case of a Shop Drawing by a specific notation made on the Shop Drawing itself.
- B. *Submittal Procedures for Shop Drawings and Samples:* Contractor shall label and submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals.
1. *Shop Drawings*
 - a. Contractor shall submit the number of copies required in the Specifications.
 - b. Data shown on the Shop Drawings must be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide, and to enable Engineer to review the information for the limited purposes required by Paragraph 7.16.C.
 2. *Samples*
 - a. Contractor shall submit the number of Samples required in the Specifications.
 - b. Contractor shall clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the Submittal for the limited purposes required by Paragraph 7.16.C.
 3. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.
- C. *Engineer's Review of Shop Drawings and Samples*
1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the accepted Schedule of Submittals. Engineer's review and approval will be only to determine if the items covered by the Submittals will, after installation or incorporation in the Work, comply with the requirements of the Contract Documents, and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.
 2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction, or to safety precautions or programs incident thereto.
 3. Engineer's review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.
 4. Engineer's review and approval of a Shop Drawing or Sample will not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 7.16.A.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer will

document any such approved variation from the requirements of the Contract Documents in a Field Order or other appropriate Contract modification.

5. Engineer's review and approval of a Shop Drawing or Sample will not relieve Contractor from responsibility for complying with the requirements of Paragraphs 7.16.A and B.
6. Engineer's review and approval of a Shop Drawing or Sample, or of a variation from the requirements of the Contract Documents, will not, under any circumstances, change the Contract Times or Contract Price, unless such changes are included in a Change Order.
7. Neither Engineer's receipt, review, acceptance, or approval of a Shop Drawing or Sample will result in such item becoming a Contract Document.
8. Contractor shall perform the Work in compliance with the requirements and commitments set forth in approved Shop Drawings and Samples, subject to the provisions of Paragraph 7.16.C.4.

D. Resubmittal Procedures for Shop Drawings and Samples

1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous Submittals.
2. Contractor shall furnish required Shop Drawing and Sample submittals with sufficient information and accuracy to obtain required approval of an item with no more than two resubmittals. Engineer will record Engineer's time for reviewing a third or subsequent resubmittal of a Shop Drawing or Sample, and Contractor shall be responsible for Engineer's charges to Owner for such time. Owner may impose a set-off against payments due Contractor to secure reimbursement for such charges.
3. If Contractor requests a change of a previously approved Shop Drawing or Sample, Contractor shall be responsible for Engineer's charges to Owner for its review time, and Owner may impose a set-off against payments due Contractor to secure reimbursement for such charges, unless the need for such change is beyond the control of Contractor.

E. Submittals Other than Shop Drawings, Samples, and Owner-Delegated Designs

1. The following provisions apply to all Submittals other than Shop Drawings, Samples, and Owner-delegated designs:
 - a. Contractor shall submit all such Submittals to the Engineer in accordance with the Schedule of Submittals and pursuant to the applicable terms of the Contract Documents.
 - b. Engineer will provide timely review of all such Submittals in accordance with the Schedule of Submittals and return such Submittals with a notation of either Accepted or Not Accepted. Any such Submittal that is not returned within the time established in the Schedule of Submittals will be deemed accepted.
 - c. Engineer's review will be only to determine if the Submittal is acceptable under the requirements of the Contract Documents as to general form and content of the Submittal.

- d. If any such Submittal is not accepted, Contractor shall confer with Engineer regarding the reason for the non-acceptance, and resubmit an acceptable document.
 2. Procedures for the submittal and acceptance of the Progress Schedule, the Schedule of Submittals, and the Schedule of Values are set forth in Paragraphs 2.03, 2.04, and 2.05.
- F. Owner-delegated Designs: Submittals pursuant to Owner-delegated designs are governed by the provisions of Paragraph 7.19.

7.17 *Contractor's General Warranty and Guarantee*

- A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer is entitled to rely on Contractor's warranty and guarantee.
- B. Owner's rights under this warranty and guarantee are in addition to, and are not limited by, Owner's rights under the correction period provisions of Paragraph 15.08. The time in which Owner may enforce its warranty and guarantee rights under this Paragraph 7.17 is limited only by applicable Laws and Regulations restricting actions to enforce such rights; provided, however, that after the end of the correction period under Paragraph 15.08:
1. Owner shall give Contractor written notice of any defective Work within 60 days of the discovery that such Work is defective; and
 2. Such notice will be deemed the start of an event giving rise to a Claim under Paragraph 12.01.B, such that any related Claim must be brought within 30 days of the notice.
- C. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:
1. abuse, or improper modification, maintenance, or operation, by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or
 2. normal wear and tear under normal usage.
- D. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents is absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents, a release of Contractor's obligation to perform the Work in accordance with the Contract Documents, or a release of Owner's warranty and guarantee rights under this Paragraph 7.17:
1. Observations by Engineer;
 2. Recommendation by Engineer or payment by Owner of any progress or final payment;
 3. The issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;
 4. Use or occupancy of the Work or any part thereof by Owner;
 5. Any review and approval of a Shop Drawing or Sample submittal;
 6. The issuance of a notice of acceptability by Engineer;
 7. The end of the correction period established in Paragraph 15.08;
 8. Any inspection, test, or approval by others; or

9. Any correction of defective Work by Owner.
- E. If the Contract requires the Contractor to accept the assignment of a contract entered into by Owner, then the specific warranties, guarantees, and correction obligations contained in the assigned contract will govern with respect to Contractor's performance obligations to Owner for the Work described in the assigned contract.

7.18 *Indemnification*

- A. To the fullest extent permitted by Laws and Regulations, and in addition to any other obligations of Contractor under the Contract or otherwise, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, from losses, damages, costs, and judgments (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising from third-party claims or actions relating to or resulting from the performance or furnishing of the Work, provided that any such claim, action, loss, cost, judgment or damage is attributable to bodily injury, sickness, disease, or death, or to damage to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom, but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable.
- B. In any and all claims against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 7.18.A will not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.

7.19 *Delegation of Professional Design Services*

- A. Owner may require Contractor to provide professional design services for a portion of the Work by express delegation in the Contract Documents. Such delegation will specify the performance and design criteria that such services must satisfy, and the Submittals that Contractor must furnish to Engineer with respect to the Owner-delegated design.
- B. Contractor shall cause such Owner-delegated professional design services to be provided pursuant to the professional standard of care by a properly licensed design professional, whose signature and seal must appear on all drawings, calculations, specifications, certifications, and Submittals prepared by such design professional. Such design professional must issue all certifications of design required by Laws and Regulations.
- C. If a Shop Drawing or other Submittal related to the Owner-delegated design is prepared by Contractor, a Subcontractor, or others for submittal to Engineer, then such Shop Drawing or other Submittal must bear the written approval of Contractor's design professional when submitted by Contractor to Engineer.

- D. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy, and completeness of the services, certifications, and approvals performed or provided by the design professionals retained or employed by Contractor under an Owner-delegated design, subject to the professional standard of care and the performance and design criteria stated in the Contract Documents.
- E. Pursuant to this Paragraph 7.19, Engineer's review, approval, and other determinations regarding design drawings, calculations, specifications, certifications, and other Submittals furnished by Contractor pursuant to an Owner-delegated design will be only for the following limited purposes:
 - 1. Checking for conformance with the requirements of this Paragraph 7.19;
 - 2. Confirming that Contractor (through its design professionals) has used the performance and design criteria specified in the Contract Documents; and
 - 3. Establishing that the design furnished by Contractor is consistent with the design concept expressed in the Contract Documents.
- F. Contractor shall not be responsible for the adequacy of performance or design criteria specified by Owner or Engineer.
- G. Contractor is not required to provide professional services in violation of applicable Laws and Regulations.

ARTICLE 8—OTHER WORK AT THE SITE

8.01 *Other Work*

- A. In addition to and apart from the Work under the Contract Documents, the Owner may perform other work at or adjacent to the Site. Such other work may be performed by Owner's employees, or through contracts between the Owner and third parties. Owner may also arrange to have third-party utility owners perform work on their utilities and facilities at or adjacent to the Site.
- B. If Owner performs other work at or adjacent to the Site with Owner's employees, or through contracts for such other work, then Owner shall give Contractor written notice thereof prior to starting any such other work. If Owner has advance information regarding the start of any third-party utility work that Owner has arranged to take place at or adjacent to the Site, Owner shall provide such information to Contractor.
- C. Contractor shall afford proper and safe access to the Site to each contractor that performs such other work, each utility owner performing other work, and Owner, if Owner is performing other work with Owner's employees, and provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work.
- D. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected.

- E. If the proper execution or results of any part of Contractor's Work depends upon work performed by others, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.
- F. The provisions of this article are not applicable to work that is performed by third-party utilities or other third-party entities without a contract with Owner, or that is performed without having been arranged by Owner. If such work occurs, then any related delay, disruption, or interference incurred by Contractor is governed by the provisions of Paragraph 4.05.C.3.

8.02 *Coordination*

- A. If Owner intends to contract with others for the performance of other work at or adjacent to the Site, to perform other work at or adjacent to the Site with Owner's employees, or to arrange to have utility owners perform work at or adjacent to the Site, the following will be set forth in the Supplementary Conditions or provided to Contractor prior to the start of any such other work:
 - 1. The identity of the individual or entity that will have authority and responsibility for coordination of the activities among the various contractors;
 - 2. An itemization of the specific matters to be covered by such authority and responsibility; and
 - 3. The extent of such authority and responsibilities.
- B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

8.03 *Legal Relationships*

- A. If, in the course of performing other work for Owner at or adjacent to the Site, the Owner's employees, any other contractor working for Owner, or any utility owner that Owner has arranged to perform work, causes damage to the Work or to the property of Contractor or its Subcontractors, or delays, disrupts, interferes with, or increases the scope or cost of the performance of the Work, through actions or inaction, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times. Contractor must submit any Change Proposal seeking an equitable adjustment in the Contract Price or the Contract Times under this paragraph within 30 days of the damaging, delaying, disrupting, or interfering event. The entitlement to, and extent of, any such equitable adjustment will take into account information (if any) regarding such other work that was provided to Contractor in the Contract Documents prior to the submittal of the Bid or the final negotiation of the terms of the Contract, and any remedies available to Contractor under Laws or Regulations concerning utility action or inaction. When applicable, any such equitable adjustment in Contract Price will be conditioned on Contractor assigning to Owner all Contractor's rights against such other contractor or utility owner with respect to the damage, delay, disruption, or interference that is the subject of the adjustment. Contractor's entitlement to an adjustment of the Contract Times or Contract Price is subject to the provisions of Paragraphs 4.05.D and 4.05.E.

- B. Contractor shall take reasonable and customary measures to avoid damaging, delaying, disrupting, or interfering with the work of Owner, any other contractor, or any utility owner performing other work at or adjacent to the Site.
 - 1. If Contractor fails to take such measures and as a result damages, delays, disrupts, or interferes with the work of any such other contractor or utility owner, then Owner may impose a set-off against payments due Contractor, and assign to such other contractor or utility owner the Owner's contractual rights against Contractor with respect to the breach of the obligations set forth in this Paragraph 8.03.B.
 - 2. When Owner is performing other work at or adjacent to the Site with Owner's employees, Contractor shall be liable to Owner for damage to such other work, and for the reasonable direct delay, disruption, and interference costs incurred by Owner as a result of Contractor's failure to take reasonable and customary measures with respect to Owner's other work. In response to such damage, delay, disruption, or interference, Owner may impose a set-off against payments due Contractor.
- C. If Contractor damages, delays, disrupts, or interferes with the work of any other contractor, or any utility owner performing other work at or adjacent to the Site, through Contractor's failure to take reasonable and customary measures to avoid such impacts, or if any claim arising out of Contractor's actions, inactions, or negligence in performance of the Work at or adjacent to the Site is made by any such other contractor or utility owner against Contractor, Owner, or Engineer, then Contractor shall (1) promptly attempt to settle the claim as to all parties through negotiations with such other contractor or utility owner, or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law, and (2) indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claims, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such damage, delay, disruption, or interference.

ARTICLE 9—OWNER'S RESPONSIBILITIES

9.01 *Communications to Contractor*

- A. Except as otherwise provided in these General Conditions, Owner shall issue all communications to Contractor through Engineer.

9.02 *Replacement of Engineer*

- A. Owner may at its discretion appoint an engineer to replace Engineer, provided Contractor makes no reasonable objection to the replacement engineer. The replacement engineer's status under the Contract Documents will be that of the former Engineer.

9.03 *Furnish Data*

- A. Owner shall promptly furnish the data required of Owner under the Contract Documents.

9.04 *Pay When Due*

- A. Owner shall make payments to Contractor when they are due as provided in the Agreement.

- 9.05 *Lands and Easements; Reports, Tests, and Drawings*
- A. Owner's duties with respect to providing lands and easements are set forth in Paragraph 5.01.
 - B. Owner's duties with respect to providing engineering surveys to establish reference points are set forth in Paragraph 4.03.
 - C. Article 5 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of conditions at the Site, and drawings of physical conditions relating to existing surface or subsurface structures at the Site.
- 9.06 *Insurance*
- A. Owner's responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 6.
- 9.07 *Change Orders*
- A. Owner's responsibilities with respect to Change Orders are set forth in Article 11.
- 9.08 *Inspections, Tests, and Approvals*
- A. Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 14.02.B.
- 9.09 *Limitations on Owner's Responsibilities*
- A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.
- 9.10 *Undisclosed Hazardous Environmental Condition*
- A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 5.06.
- 9.11 *Evidence of Financial Arrangements*
- A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract (including obligations under proposed changes in the Work).
- 9.12 *Safety Programs*
- A. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed.
 - B. Owner shall furnish copies of any applicable Owner safety programs to Contractor.

ARTICLE 10—ENGINEER'S STATUS DURING CONSTRUCTION

10.01 *Owner's Representative*

- A. Engineer will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner's representative during construction are set forth in the Contract.

10.02 *Visits to Site*

- A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe, as an experienced and qualified design professional, the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.
- B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 10.07. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

10.03 *Resident Project Representative*

- A. If Owner and Engineer have agreed that Engineer will furnish a Resident Project Representative to represent Engineer at the Site and assist Engineer in observing the progress and quality of the Work, then the authority and responsibilities of any such Resident Project Representative will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in the Supplementary Conditions and in Paragraph 10.07.
- B. If Owner designates an individual or entity who is not Engineer's consultant, agent, or employee to represent Owner at the Site, then the responsibilities and authority of such individual or entity will be as provided in the Supplementary Conditions.

10.04 *Engineer's Authority*

- A. Engineer has the authority to reject Work in accordance with Article 14.
- B. Engineer's authority as to Submittals is set forth in Paragraph 7.16.
- C. Engineer's authority as to design drawings, calculations, specifications, certifications and other Submittals from Contractor in response to Owner's delegation (if any) to Contractor of professional design services, is set forth in Paragraph 7.19.
- D. Engineer's authority as to changes in the Work is set forth in Article 11.

E. Engineer's authority as to Applications for Payment is set forth in Article 15.

10.05 *Determinations for Unit Price Work*

A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor as set forth in Paragraph 13.03.

10.06 *Decisions on Requirements of Contract Documents and Acceptability of Work*

A. Engineer will render decisions regarding the requirements of the Contract Documents, and judge the acceptability of the Work, pursuant to the specific procedures set forth herein for initial interpretations, Change Proposals, and acceptance of the Work. In rendering such decisions and judgments, Engineer will not show partiality to Owner or Contractor, and will not be liable to Owner, Contractor, or others in connection with any proceedings, interpretations, decisions, or judgments conducted or rendered in good faith.

10.07 *Limitations on Engineer's Authority and Responsibilities*

A. Neither Engineer's authority or responsibility under this Article 10 or under any other provision of the Contract, nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer, will create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.

D. Engineer's review of the final Application for Payment and accompanying documentation, and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Contractor under Paragraph 15.06.A, will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals, that the results certified indicate compliance with the Contract Documents.

E. The limitations upon authority and responsibility set forth in this Paragraph 10.07 also apply to the Resident Project Representative, if any.

10.08 *Compliance with Safety Program*

A. While at the Site, Engineer's employees and representatives will comply with the specific applicable requirements of Owner's and Contractor's safety programs of which Engineer has been informed.

ARTICLE 11—CHANGES TO THE CONTRACT

11.01 *Amending and Supplementing the Contract*

- A. The Contract may be amended or supplemented by a Change Order, a Work Change Directive, or a Field Order.
- B. If an amendment or supplement to the Contract includes a change in the Contract Price or the Contract Times, such amendment or supplement must be set forth in a Change Order.
- C. All changes to the Contract that involve (1) the performance or acceptability of the Work, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, must be supported by Engineer's recommendation. Owner and Contractor may amend other terms and conditions of the Contract without the recommendation of the Engineer.

11.02 *Change Orders*

- A. Owner and Contractor shall execute appropriate Change Orders covering:
 - 1. Changes in Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive;
 - 2. Changes in Contract Price resulting from an Owner set-off, unless Contractor has duly contested such set-off;
 - 3. Changes in the Work which are: (a) ordered by Owner pursuant to Paragraph 11.05, (b) required because of Owner's acceptance of defective Work under Paragraph 14.04 or Owner's correction of defective Work under Paragraph 14.07, or (c) agreed to by the parties, subject to the need for Engineer's recommendation if the change in the Work involves the design (as set forth in the Drawings, Specifications, or otherwise) or other engineering or technical matters; and
 - 4. Changes that embody the substance of any final and binding results under: Paragraph 11.03.B, resolving the impact of a Work Change Directive; Paragraph 11.09, concerning Change Proposals; Article 12, Claims; Paragraph 13.02.D, final adjustments resulting from allowances; Paragraph 13.03.D, final adjustments relating to determination of quantities for Unit Price Work; and similar provisions.
- B. If Owner or Contractor refuses to execute a Change Order that is required to be executed under the terms of Paragraph 11.02.A, it will be deemed to be of full force and effect, as if fully executed.

11.03 *Work Change Directives*

- A. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the modification ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order, following negotiations by the parties as to the Work Change Directive's effect, if any, on the Contract Price and Contract Times; or, if negotiations are unsuccessful, by a determination under the terms of the Contract Documents governing adjustments, expressly including Paragraph 11.07 regarding change of Contract Price.

- B. If Owner has issued a Work Change Directive and:
 - 1. Contractor believes that an adjustment in Contract Times or Contract Price is necessary, then Contractor shall submit any Change Proposal seeking such an adjustment no later than 30 days after the completion of the Work set out in the Work Change Directive.
 - 2. Owner believes that an adjustment in Contract Times or Contract Price is necessary, then Owner shall submit any Claim seeking such an adjustment no later than 60 days after issuance of the Work Change Directive.

11.04 *Field Orders*

- A. Engineer may authorize minor changes in the Work if the changes do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Such changes will be accomplished by a Field Order and will be binding on Owner and also on Contractor, which shall perform the Work involved promptly.
- B. If Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, then before proceeding with the Work at issue, Contractor shall submit a Change Proposal as provided herein.

11.05 *Owner-Authorized Changes in the Work*

- A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work. Changes involving the design (as set forth in the Drawings, Specifications, or otherwise) or other engineering or technical matters will be supported by Engineer's recommendation.
- B. Such changes in the Work may be accomplished by a Change Order, if Owner and Contractor have agreed as to the effect, if any, of the changes on Contract Times or Contract Price; or by a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved; or, in the case of a deletion in the Work, promptly cease construction activities with respect to such deleted Work. Added or revised Work must be performed under the applicable conditions of the Contract Documents.
- C. Nothing in this Paragraph 11.05 obligates Contractor to undertake work that Contractor reasonably concludes cannot be performed in a manner consistent with Contractor's safety obligations under the Contract Documents or Laws and Regulations.

11.06 *Unauthorized Changes in the Work*

- A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents, as amended, modified, or supplemented, except in the case of an emergency as provided in Paragraph 7.15 or in the case of uncovering Work as provided in Paragraph 14.05.C.2.

11.07 *Change of Contract Price*

- A. The Contract Price may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Price must comply with the provisions of Paragraph 11.09. Any Claim for an adjustment of Contract Price must comply with the provisions of Article 12.
- B. An adjustment in the Contract Price will be determined as follows:

1. Where the Work involved is covered by unit prices contained in the Contract Documents, then by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 13.03);
 2. Where the Work involved is not covered by unit prices contained in the Contract Documents, then by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 11.07.C.2); or
 3. Where the Work involved is not covered by unit prices contained in the Contract Documents and the parties do not reach mutual agreement to a lump sum, then on the basis of the Cost of the Work (determined as provided in Paragraph 13.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 11.07.C).
- C. *Contractor's Fee:* When applicable, the Contractor's fee for overhead and profit will be determined as follows:
1. A mutually acceptable fixed fee; or
 2. If a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:
 - a. For costs incurred under Paragraphs 13.01.B.1 and 13.01.B.2, the Contractor's fee will be 15 percent;
 - b. For costs incurred under Paragraph 13.01.B.3, the Contractor's fee will be 5 percent;
 - c. Where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 11.07.C.2.a and 11.07.C.2.b is that the Contractor's fee will be based on: (1) a fee of 15 percent of the costs incurred under Paragraphs 13.01.B.1 and 13.01.B.2 by the Subcontractor that actually performs the Work, at whatever tier, and (2) with respect to Contractor itself and to any Subcontractors of a tier higher than that of the Subcontractor that actually performs the Work, a fee of 5 percent of the amount (fee plus underlying costs incurred) attributable to the next lower tier Subcontractor; provided, however, that for any such subcontracted Work the maximum total fee to be paid by Owner will be no greater than 27 percent of the costs incurred by the Subcontractor that actually performs the Work;
 - d. No fee will be payable on the basis of costs itemized under Paragraphs 13.01.B.4, 13.01.B.5, and 13.01.C;
 - e. The amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in Cost of the Work will be the amount of the actual net decrease in Cost of the Work and a deduction of an additional amount equal to 5 percent of such actual net decrease in Cost of the Work; and
 - f. When both additions and credits are involved in any one change or Change Proposal, the adjustment in Contractor's fee will be computed by determining the sum of the costs in each of the cost categories in Paragraph 13.01.B (specifically, payroll costs, Paragraph 13.01.B.1; incorporated materials and equipment costs, Paragraph 13.01.B.2; Subcontract costs, Paragraph 13.01.B.3; special consultants costs, Paragraph 13.01.B.4; and other costs, Paragraph 13.01.B.5) and applying to each such cost category sum the appropriate fee from Paragraphs 11.07.C.2.a through 11.07.C.2.e, inclusive.

11.08 *Change of Contract Times*

- A. The Contract Times may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Times must comply with the provisions of Paragraph 11.09. Any Claim for an adjustment in the Contract Times must comply with the provisions of Article 12.
- B. Delay, disruption, and interference in the Work, and any related changes in Contract Times, are addressed in and governed by Paragraph 4.05.

11.09 *Change Proposals*

A. *Purpose and Content:* Contractor shall submit a Change Proposal to Engineer to request an adjustment in the Contract Times or Contract Price; contest an initial decision by Engineer concerning the requirements of the Contract Documents or relating to the acceptability of the Work under the Contract Documents; challenge a set-off against payment due; or seek other relief under the Contract. The Change Proposal will specify any proposed change in Contract Times or Contract Price, or other proposed relief, and explain the reason for the proposed change, with citations to any governing or applicable provisions of the Contract Documents. Each Change Proposal will address only one issue, or a set of closely related issues.

B. *Change Proposal Procedures*

1. *Submittal:* Contractor shall submit each Change Proposal to Engineer within 30 days after the start of the event giving rise thereto, or after such initial decision.
2. *Supporting Data:* The Contractor shall submit supporting data, including the proposed change in Contract Price or Contract Time (if any), to the Engineer and Owner within 15 days after the submittal of the Change Proposal.
 - a. Change Proposals based on or related to delay, interruption, or interference must comply with the provisions of Paragraphs 4.05.D and 4.05.E.
 - b. Change proposals related to a change of Contract Price must include full and detailed accounts of materials incorporated into the Work and labor and equipment used for the subject Work.

The supporting data must be accompanied by a written statement that the supporting data are accurate and complete, and that any requested time or price adjustment is the entire adjustment to which Contractor believes it is entitled as a result of said event.

3. *Engineer's Initial Review:* Engineer will advise Owner regarding the Change Proposal, and consider any comments or response from Owner regarding the Change Proposal. If in its discretion Engineer concludes that additional supporting data is needed before conducting a full review and making a decision regarding the Change Proposal, then Engineer may request that Contractor submit such additional supporting data by a date specified by Engineer, prior to Engineer beginning its full review of the Change Proposal.
4. *Engineer's Full Review and Action on the Change Proposal:* Upon receipt of Contractor's supporting data (including any additional data requested by Engineer), Engineer will conduct a full review of each Change Proposal and, within 30 days after such receipt of the Contractor's supporting data, either approve the Change Proposal in whole, deny it in whole, or approve it in part and deny it in part. Such actions must be in writing, with a copy provided to Owner and Contractor. If Engineer does not take action on the Change

Proposal within 30 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of Engineer's inaction the Change Proposal is deemed denied, thereby commencing the time for appeal of the denial under Article 12.

5. *Binding Decision*: Engineer's decision is final and binding upon Owner and Contractor, unless Owner or Contractor appeals the decision by filing a Claim under Article 12.
- C. *Resolution of Certain Change Proposals*: If the Change Proposal does not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters, then Engineer will notify the parties in writing that the Engineer is unable to resolve the Change Proposal. For purposes of further resolution of such a Change Proposal, such notice will be deemed a denial, and Contractor may choose to seek resolution under the terms of Article 12.
- D. *Post-Completion*: Contractor shall not submit any Change Proposals after Engineer issues a written recommendation of final payment pursuant to Paragraph 15.06.B.

11.10 *Notification to Surety*

- A. If the provisions of any bond require notice to be given to a surety of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times), the giving of any such notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

ARTICLE 12—CLAIMS

12.01 *Claims*

- A. *Claims Process*: The following disputes between Owner and Contractor are subject to the Claims process set forth in this article:
 1. Appeals by Owner or Contractor of Engineer's decisions regarding Change Proposals;
 2. Owner demands for adjustments in the Contract Price or Contract Times, or other relief under the Contract Documents;
 3. Disputes that Engineer has been unable to address because they do not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters; and
 4. Subject to the waiver provisions of Paragraph 15.07, any dispute arising after Engineer has issued a written recommendation of final payment pursuant to Paragraph 15.06.B.
- B. *Submittal of Claim*: The party submitting a Claim shall deliver it directly to the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto; in the case of appeals regarding Change Proposals within 30 days of the decision under appeal. The party submitting the Claim shall also furnish a copy to the Engineer, for its information only. The responsibility to substantiate a Claim rests with the party making the Claim. In the case of a Claim by Contractor seeking an increase in the Contract Times or Contract Price, Contractor shall certify that the Claim is made in good faith, that the supporting data are accurate and complete, and that to the best of Contractor's knowledge

and belief the amount of time or money requested accurately reflects the full amount to which Contractor is entitled.

- C. *Review and Resolution*: The party receiving a Claim shall review it thoroughly, giving full consideration to its merits. The two parties shall seek to resolve the Claim through the exchange of information and direct negotiations. The parties may extend the time for resolving the Claim by mutual agreement. All actions taken on a Claim will be stated in writing and submitted to the other party, with a copy to Engineer.
- D. *Mediation*
 - 1. At any time after initiation of a Claim, Owner and Contractor may mutually agree to mediation of the underlying dispute. The agreement to mediate will stay the Claim submittal and response process.
 - 2. If Owner and Contractor agree to mediation, then after 60 days from such agreement, either Owner or Contractor may unilaterally terminate the mediation process, and the Claim submittal and decision process will resume as of the date of the termination. If the mediation proceeds but is unsuccessful in resolving the dispute, the Claim submittal and decision process will resume as of the date of the conclusion of the mediation, as determined by the mediator.
 - 3. Owner and Contractor shall each pay one-half of the mediator's fees and costs.
- E. *Partial Approval*: If the party receiving a Claim approves the Claim in part and denies it in part, such action will be final and binding unless within 30 days of such action the other party invokes the procedure set forth in Article 17 for final resolution of disputes.
- F. *Denial of Claim*: If efforts to resolve a Claim are not successful, the party receiving the Claim may deny it by giving written notice of denial to the other party. If the receiving party does not take action on the Claim within 90 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of the inaction, the Claim is deemed denied, thereby commencing the time for appeal of the denial. A denial of the Claim will be final and binding unless within 30 days of the denial the other party invokes the procedure set forth in Article 17 for the final resolution of disputes.
- G. *Final and Binding Results*: If the parties reach a mutual agreement regarding a Claim, whether through approval of the Claim, direct negotiations, mediation, or otherwise; or if a Claim is approved in part and denied in part, or denied in full, and such actions become final and binding; then the results of the agreement or action on the Claim will be incorporated in a Change Order or other written document to the extent they affect the Contract, including the Work, the Contract Times, or the Contract Price.

ARTICLE 13—COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

13.01 *Cost of the Work*

- A. *Purposes for Determination of Cost of the Work*: The term Cost of the Work means the sum of all costs necessary for the proper performance of the Work at issue, as further defined below. The provisions of this Paragraph 13.01 are used for two distinct purposes:
 - 1. To determine Cost of the Work when Cost of the Work is a component of the Contract Price, under cost-plus-fee, time-and-materials, or other cost-based terms; or

2. When needed to determine the value of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price. When the value of any such adjustment is determined on the basis of Cost of the Work, Contractor is entitled only to those additional or incremental costs required because of the change in the Work or because of the event giving rise to the adjustment.
- B. *Costs Included:* Except as otherwise may be agreed to in writing by Owner, costs included in the Cost of the Work will be in amounts no higher than those commonly incurred in the locality of the Project, will not include any of the costs itemized in Paragraph 13.01.C, and will include only the following items:
1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor in advance of the subject Work. Such employees include, without limitation, superintendents, foremen, safety managers, safety representatives, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work will be apportioned on the basis of their time spent on the Work. Payroll costs include, but are not limited to, salaries and wages plus the cost of fringe benefits, which include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, sick leave, and vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, will be included in the above to the extent authorized by Owner.
 2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts will accrue to Owner. All trade discounts, rebates, and refunds and returns from sale of surplus materials and equipment will accrue to Owner, and Contractor shall make provisions so that they may be obtained.
 3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, which will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee will be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 13.01.
 4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed or retained for services specifically related to the Work.
 5. Other costs consisting of the following:
 - a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.
 - b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, which are

consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.

- 1) In establishing included costs for materials such as scaffolding, plating, or sheeting, consideration will be given to the actual or the estimated life of the material for use on other projects; or rental rates may be established on the basis of purchase or salvage value of such items, whichever is less. Contractor will not be eligible for compensation for such items in an amount that exceeds the purchase cost of such item.

c. *Construction Equipment Rental*

- 1) Rentals of all construction equipment and machinery, and the parts thereof, in accordance with rental agreements approved by Owner as to price (including any surcharge or special rates applicable to overtime use of the construction equipment or machinery), and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs will be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts must cease when the use thereof is no longer necessary for the Work.
- 2) Costs for equipment and machinery owned by Contractor or a Contractor-related entity will be paid at a rate shown for such equipment in the equipment rental rate book specified in the Supplementary Conditions. An hourly rate will be computed by dividing the monthly rates by 176. These computed rates will include all operating costs.
- 3) With respect to Work that is the result of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price ("changed Work"), included costs will be based on the time the equipment or machinery is in use on the changed Work and the costs of transportation, loading, unloading, assembly, dismantling, and removal when directly attributable to the changed Work. The cost of any such equipment or machinery, or parts thereof, must cease to accrue when the use thereof is no longer necessary for the changed Work.

- d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.
- e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.
- f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of builder's risk or other property insurance established in accordance with Paragraph 6.04), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses will be included in the Cost of the Work for the purpose of determining Contractor's fee.

- g. The cost of utilities, fuel, and sanitary facilities at the Site.
 - h. Minor expenses such as communication service at the Site, express and courier services, and similar petty cash items in connection with the Work.
 - i. The costs of premiums for all bonds and insurance that Contractor is required by the Contract Documents to purchase and maintain.
- C. *Costs Excluded:* The term Cost of the Work does not include any of the following items:
- 1. Payroll costs and other compensation of Contractor's officers, executives, principals, general managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 13.01.B.1 or specifically covered by Paragraph 13.01.B.4. The payroll costs and other compensation excluded here are to be considered administrative costs covered by the Contractor's fee.
 - 2. The cost of purchasing, renting, or furnishing small tools and hand tools.
 - 3. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
 - 4. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
 - 5. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.
 - 6. Expenses incurred in preparing and advancing Claims.
 - 7. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraph 13.01.B.
- D. *Contractor's Fee*
- 1. When the Work as a whole is performed on the basis of cost-plus-a-fee, then:
 - a. Contractor's fee for the Work set forth in the Contract Documents as of the Effective Date of the Contract will be determined as set forth in the Agreement.
 - b. for any Work covered by a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price on the basis of Cost of the Work, Contractor's fee will be determined as follows:
 - 1) When the fee for the Work as a whole is a percentage of the Cost of the Work, the fee will automatically adjust as the Cost of the Work changes.
 - 2) When the fee for the Work as a whole is a fixed fee, the fee for any additions or deletions will be determined in accordance with Paragraph 11.07.C.2.
 - 2. When the Work as a whole is performed on the basis of a stipulated sum, or any other basis other than cost-plus-a-fee, then Contractor's fee for any Work covered by a Change

Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price on the basis of Cost of the Work will be determined in accordance with Paragraph 11.07.C.2.

- E. *Documentation and Audit*: Whenever the Cost of the Work for any purpose is to be determined pursuant to this Article 13, Contractor and pertinent Subcontractors will establish and maintain records of the costs in accordance with generally accepted accounting practices. Subject to prior written notice, Owner will be afforded reasonable access, during normal business hours, to all Contractor's accounts, records, books, correspondence, instructions, drawings, receipts, vouchers, memoranda, and similar data relating to the Cost of the Work and Contractor's fee. Contractor shall preserve all such documents for a period of three years after the final payment by Owner. Pertinent Subcontractors will afford such access to Owner, and preserve such documents, to the same extent required of Contractor.

13.02 Allowances

- A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.
- B. *Cash Allowances*: Contractor agrees that:
 - 1. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and
 - 2. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment for any of the foregoing will be valid.
- C. *Owner's Contingency Allowance*: Contractor agrees that an Owner's contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.
- D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor for Work covered by allowances, and the Contract Price will be correspondingly adjusted.

13.03 Unit Price Work

- A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.
- B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Payments to Contractor for Unit Price Work will be based on actual quantities.
- C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.
- D. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision

thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, and the final adjustment of Contract Price will be set forth in a Change Order, subject to the provisions of the following paragraph.

E. *Adjustments in Unit Price*

1. Contractor or Owner shall be entitled to an adjustment in the unit price with respect to an item of Unit Price Work if:
 - a. the quantity of the item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and
 - b. Contractor's unit costs to perform the item of Unit Price Work have changed materially and significantly as a result of the quantity change.
2. The adjustment in unit price will account for and be coordinated with any related changes in quantities of other items of Work, and in Contractor's costs to perform such other Work, such that the resulting overall change in Contract Price is equitable to Owner and Contractor.
3. Adjusted unit prices will apply to all units of that item.

ARTICLE 14—TESTS AND INSPECTIONS; CORRECTION, REMOVAL, OR ACCEPTANCE OF DEFECTIVE WORK

14.01 *Access to Work*

- A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and authorities having jurisdiction have access to the Site and the Work at reasonable times for their observation, inspection, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's safety procedures and programs so that they may comply with such procedures and programs as applicable.

14.02 *Tests, Inspections, and Approvals*

- A. Contractor shall give Engineer timely notice of readiness of the Work (or specific parts thereof) for all required inspections and tests, and shall cooperate with inspection and testing personnel to facilitate required inspections and tests.
- B. Owner shall retain and pay for the services of an independent inspector, testing laboratory, or other qualified individual or entity to perform all inspections and tests expressly required by the Contract Documents to be furnished and paid for by Owner, except that costs incurred in connection with tests or inspections of covered Work will be governed by the provisions of Paragraph 14.05.
- C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.

- D. Contractor shall be responsible for arranging, obtaining, and paying for all inspections and tests required:
1. by the Contract Documents, unless the Contract Documents expressly allocate responsibility for a specific inspection or test to Owner;
 2. to attain Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work;
 3. by manufacturers of equipment furnished under the Contract Documents;
 4. for testing, adjusting, and balancing of mechanical, electrical, and other equipment to be incorporated into the Work; and
 5. for acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work.

Such inspections and tests will be performed by independent inspectors, testing laboratories, or other qualified individuals or entities acceptable to Owner and Engineer.

- E. If the Contract Documents require the Work (or part thereof) to be approved by Owner, Engineer, or another designated individual or entity, then Contractor shall assume full responsibility for arranging and obtaining such approvals.
- F. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation. Such uncovering will be at Contractor's expense unless Contractor had given Engineer timely notice of Contractor's intention to cover the same and Engineer had not acted with reasonable promptness in response to such notice.

14.03 *Defective Work*

- A. *Contractor's Obligation:* It is Contractor's obligation to assure that the Work is not defective.
- B. *Engineer's Authority:* Engineer has the authority to determine whether Work is defective, and to reject defective Work.
- C. *Notice of Defects:* Prompt written notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor.
- D. *Correction, or Removal and Replacement:* Promptly after receipt of written notice of defective Work, Contractor shall correct all such defective Work, whether or not fabricated, installed, or completed, or, if Engineer has rejected the defective Work, remove it from the Project and replace it with Work that is not defective.
- E. *Preservation of Warranties:* When correcting defective Work, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.
- F. *Costs and Damages:* In addition to its correction, removal, and replacement obligations with respect to defective Work, Contractor shall pay all claims, costs, losses, and damages arising out of or relating to defective Work, including but not limited to the cost of the inspection, testing, correction, removal, replacement, or reconstruction of such defective Work, fines levied against Owner by governmental authorities because the Work is defective, and the costs of repair or replacement of work of others resulting from defective Work. Prior to final payment, if Owner and Contractor are unable to agree as to the measure of such claims, costs,

losses, and damages resulting from defective Work, then Owner may impose a reasonable set-off against payments due under Article 15.

14.04 *Acceptance of Defective Work*

- A. If, instead of requiring correction or removal and replacement of defective Work, Owner prefers to accept it, Owner may do so (subject, if such acceptance occurs prior to final payment, to Engineer's confirmation that such acceptance is in general accord with the design intent and applicable engineering principles, and will not endanger public safety). Contractor shall pay all claims, costs, losses, and damages attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness), and for the diminished value of the Work to the extent not otherwise paid by Contractor. If any such acceptance occurs prior to final payment, the necessary revisions in the Contract Documents with respect to the Work will be incorporated in a Change Order. If the parties are unable to agree as to the decrease in the Contract Price, reflecting the diminished value of Work so accepted, then Owner may impose a reasonable set-off against payments due under Article 15. If the acceptance of defective Work occurs after final payment, Contractor shall pay an appropriate amount to Owner.

14.05 *Uncovering Work*

- A. Engineer has the authority to require additional inspection or testing of the Work, whether or not the Work is fabricated, installed, or completed.
- B. If any Work is covered contrary to the written request of Engineer, then Contractor shall, if requested by Engineer, uncover such Work for Engineer's observation, and then replace the covering, all at Contractor's expense.
- C. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, then Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, and provide all necessary labor, material, and equipment.
 - 1. If it is found that the uncovered Work is defective, Contractor shall be responsible for all claims, costs, losses, and damages arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and pending Contractor's full discharge of this responsibility the Owner shall be entitled to impose a reasonable set-off against payments due under Article 15.
 - 2. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, then Contractor may submit a Change Proposal within 30 days of the determination that the Work is not defective.

14.06 *Owner May Stop the Work*

- A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, then Owner may order Contractor to stop the Work,

or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work will not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

14.07 *Owner May Correct Defective Work*

- A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace defective Work as required by Engineer, then Owner may, after 7 days' written notice to Contractor, correct or remedy any such deficiency.
- B. In exercising the rights and remedies under this Paragraph 14.07, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this paragraph.
- C. All claims, costs, losses, and damages incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 14.07 will be charged against Contractor as set-offs against payments due under Article 15. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.
- D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 14.07.

ARTICLE 15—PAYMENTS TO CONTRACTOR; SET-OFFS; COMPLETION; CORRECTION PERIOD

15.01 *Progress Payments*

- A. *Basis for Progress Payments:* The Schedule of Values established as provided in Article 2 will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments for Unit Price Work will be based on the number of units completed during the pay period, as determined under the provisions of Paragraph 13.03. Progress payments for cost-based Work will be based on Cost of the Work completed by Contractor during the pay period.
- B. *Applications for Payments*
 - 1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents.
 - 2. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment must also be accompanied by: (a) a bill of sale, invoice, copies of subcontract or purchase order payments, or other documentation

establishing full payment by Contractor for the materials and equipment; (b) at Owner's request, documentation warranting that Owner has received the materials and equipment free and clear of all Liens; and (c) evidence that the materials and equipment are covered by appropriate property insurance, a warehouse bond, or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.

3. Beginning with the second Application for Payment, each Application must include an affidavit of Contractor stating that all previous progress payments received by Contractor have been applied to discharge Contractor's legitimate obligations associated with prior Applications for Payment.
4. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

C. *Review of Applications*

1. Engineer will, within 10 days after receipt of each Application for Payment, including each resubmittal, either indicate in writing a recommendation of payment and present the Application to Owner, or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.
2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:
 - a. the Work has progressed to the point indicated;
 - b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 13.03, and any other qualifications stated in the recommendation); and
 - c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.
3. By recommending any such payment Engineer will not thereby be deemed to have represented that:
 - a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract; or
 - b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.

4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:
 - a. to supervise, direct, or control the Work;
 - b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto;
 - c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work;
 - d. to make any examination to ascertain how or for what purposes Contractor has used the money paid by Owner; or
 - e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.
5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 15.01.C.2.
6. Engineer will recommend reductions in payment (set-offs) necessary in Engineer's opinion to protect Owner from loss because:
 - a. the Work is defective, requiring correction or replacement;
 - b. the Contract Price has been reduced by Change Orders;
 - c. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;
 - d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible; or
 - e. Engineer has actual knowledge of the occurrence of any of the events that would constitute a default by Contractor and therefore justify termination for cause under the Contract Documents.

D. Payment Becomes Due

1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended (subject to any Owner set-offs) will become due, and when due will be paid by Owner to Contractor.

E. Reductions in Payment by Owner

1. In addition to any reductions in payment (set-offs) recommended by Engineer, Owner is entitled to impose a set-off against payment based on any of the following:
 - a. Claims have been made against Owner based on Contractor's conduct in the performance or furnishing of the Work, or Owner has incurred costs, losses, or damages resulting from Contractor's conduct in the performance or furnishing of the Work, including but not limited to claims, costs, losses, or damages from workplace injuries, adjacent property damage, non-compliance with Laws and Regulations, and patent infringement;

- b. Contractor has failed to take reasonable and customary measures to avoid damage, delay, disruption, and interference with other work at or adjacent to the Site;
 - c. Contractor has failed to provide and maintain required bonds or insurance;
 - d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible;
 - e. Owner has incurred extra charges or engineering costs related to submittal reviews, evaluations of proposed substitutes, tests and inspections, or return visits to manufacturing or assembly facilities;
 - f. The Work is defective, requiring correction or replacement;
 - g. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;
 - h. The Contract Price has been reduced by Change Orders;
 - i. An event has occurred that would constitute a default by Contractor and therefore justify a termination for cause;
 - j. Liquidated or other damages have accrued as a result of Contractor's failure to achieve Milestones, Substantial Completion, or final completion of the Work;
 - k. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens; or
 - l. Other items entitle Owner to a set-off against the amount recommended.
2. If Owner imposes any set-off against payment, whether based on its own knowledge or on the written recommendations of Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and the specific amount of the reduction, and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, if Contractor remedies the reasons for such action. The reduction imposed will be binding on Contractor unless it duly submits a Change Proposal contesting the reduction.
 3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld will be treated as an amount due as determined by Paragraph 15.01.D.1 and subject to interest as provided in the Agreement.

15.02 *Contractor's Warranty of Title*

- A. Contractor warrants and guarantees that title to all Work, materials, and equipment furnished under the Contract will pass to Owner free and clear of (1) all Liens and other title defects, and (2) all patent, licensing, copyright, or royalty obligations, no later than 7 days after the time of payment by Owner.

15.03 *Substantial Completion*

- A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete and request that Engineer issue a certificate of Substantial Completion. Contractor shall at the same time

submit to Owner and Engineer an initial draft of punch list items to be completed or corrected before final payment.

- B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.
- C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a preliminary certificate of Substantial Completion which will fix the date of Substantial Completion. Engineer shall attach to the certificate a punch list of items to be completed or corrected before final payment. Owner shall have 7 days after receipt of the preliminary certificate during which to make written objection to Engineer as to any provisions of the certificate or attached punch list. If, after considering the objections to the provisions of the preliminary certificate, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the preliminary certificate to Owner, notify Contractor in writing that the Work is not substantially complete, stating the reasons therefor. If Owner does not object to the provisions of the certificate, or if despite consideration of Owner's objections Engineer concludes that the Work is substantially complete, then Engineer will, within said 14 days, execute and deliver to Owner and Contractor a final certificate of Substantial Completion (with a revised punch list of items to be completed or corrected) reflecting such changes from the preliminary certificate as Engineer believes justified after consideration of any objections from Owner.
- D. At the time of receipt of the preliminary certificate of Substantial Completion, Owner and Contractor will confer regarding Owner's use or occupancy of the Work following Substantial Completion, review the builder's risk insurance policy with respect to the end of the builder's risk coverage, and confirm the transition to coverage of the Work under a permanent property insurance policy held by Owner. Unless Owner and Contractor agree otherwise in writing, Owner shall bear responsibility for security, operation, protection of the Work, property insurance, maintenance, heat, and utilities upon Owner's use or occupancy of the Work.
- E. After Substantial Completion the Contractor shall promptly begin work on the punch list of items to be completed or corrected prior to final payment. In appropriate cases Contractor may submit monthly Applications for Payment for completed punch list items, following the progress payment procedures set forth above.
- F. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the punch list.

15.04 *Partial Use or Occupancy*

- A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without

significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:

1. At any time, Owner may request in writing that Contractor permit Owner to use or occupy any such part of the Work that Owner believes to be substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 15.03.A through 15.03.E for that part of the Work.
2. At any time, Contractor may notify Owner and Engineer in writing that Contractor considers any such part of the Work substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.
3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 15.03 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.
4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 6.04 regarding builder's risk or other property insurance.

15.05 *Final Inspection*

- A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work, or agreed portion thereof, is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

15.06 *Final Payment*

A. *Application for Payment*

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, annotated record documents (as provided in Paragraph 7.12), and other documents, Contractor may make application for final payment.
2. The final Application for Payment must be accompanied (except as previously delivered) by:
 - a. all documentation called for in the Contract Documents;
 - b. consent of the surety, if any, to final payment;
 - c. satisfactory evidence that all title issues have been resolved such that title to all Work, materials, and equipment has passed to Owner free and clear of any Liens or other title defects, or will so pass upon final payment.

- d. a list of all duly pending Change Proposals and Claims; and
 - e. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of the Work, and of Liens filed in connection with the Work.
3. In lieu of the releases or waivers of Liens specified in Paragraph 15.06.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (a) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (b) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien, or Owner at its option may issue joint checks payable to Contractor and specified Subcontractors and Suppliers.
- B. *Engineer's Review of Final Application and Recommendation of Payment:* If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract have been fulfilled, Engineer will, within 10 days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of final payment and present the final Application for Payment to Owner for payment. Such recommendation will account for any set-offs against payment that are necessary in Engineer's opinion to protect Owner from loss for the reasons stated above with respect to progress payments. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.
- C. *Notice of Acceptability:* In support of its recommendation of payment of the final Application for Payment, Engineer will also give written notice to Owner and Contractor that the Work is acceptable, subject to stated limitations in the notice and to the provisions of Paragraph 15.07.
- D. *Completion of Work:* The Work is complete (subject to surviving obligations) when it is ready for final payment as established by the Engineer's written recommendation of final payment and issuance of notice of the acceptability of the Work.
- E. *Final Payment Becomes Due:* Upon receipt from Engineer of the final Application for Payment and accompanying documentation, Owner shall set off against the amount recommended by Engineer for final payment any further sum to which Owner is entitled, including but not limited to set-offs for liquidated damages and set-offs allowed under the provisions of this Contract with respect to progress payments. Owner shall pay the resulting balance due to Contractor within 30 days of Owner's receipt of the final Application for Payment from Engineer.

15.07 *Waiver of Claims*

- A. By making final payment, Owner waives its claim or right to liquidated damages or other damages for late completion by Contractor, except as set forth in an outstanding Claim,

appeal under the provisions of Article 17, set-off, or express reservation of rights by Owner. Owner reserves all other claims or rights after final payment.

- B. The acceptance of final payment by Contractor will constitute a waiver by Contractor of all claims and rights against Owner other than those pending matters that have been duly submitted as a Claim, or appealed under the provisions of Article 17.

15.08 *Correction Period*

- A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the Supplementary Conditions or the terms of any applicable special guarantee required by the Contract Documents), Owner gives Contractor written notice that any Work has been found to be defective, or that Contractor's repair of any damages to the Site or adjacent areas has been found to be defective, then after receipt of such notice of defect Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:
 - 1. correct the defective repairs to the Site or such adjacent areas;
 - 2. correct such defective Work;
 - 3. remove the defective Work from the Project and replace it with Work that is not defective, if the defective Work has been rejected by Owner, and
 - 4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others, or to other land or areas resulting from the corrective measures.
- B. Owner shall give any such notice of defect within 60 days of the discovery that such Work or repairs is defective. If such notice is given within such 60 days but after the end of the correction period, the notice will be deemed a notice of defective Work under Paragraph 7.17.B.
- C. If, after receipt of a notice of defect within 60 days and within the correction period, Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. Contractor shall pay all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others). Contractor's failure to pay such costs, losses, and damages within 10 days of invoice from Owner will be deemed the start of an event giving rise to a Claim under Paragraph 12.01.B, such that any related Claim must be brought within 30 days of the failure to pay.
- D. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.
- E. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this paragraph, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

- F. Contractor's obligations under this paragraph are in addition to all other obligations and warranties. The provisions of this paragraph are not to be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

ARTICLE 16—SUSPENSION OF WORK AND TERMINATION

16.01 *Owner May Suspend Work*

- A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by written notice to Contractor and Engineer. Such notice will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be entitled to an adjustment in the Contract Price or an extension of the Contract Times directly attributable to any such suspension. Any Change Proposal seeking such adjustments must be submitted no later than 30 days after the date fixed for resumption of Work.

16.02 *Owner May Terminate for Cause*

- A. The occurrence of any one or more of the following events will constitute a default by Contractor and justify termination for cause:
 - 1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment, or failure to adhere to the Progress Schedule);
 - 2. Failure of Contractor to perform or otherwise to comply with a material term of the Contract Documents;
 - 3. Contractor's disregard of Laws or Regulations of any public body having jurisdiction; or
 - 4. Contractor's repeated disregard of the authority of Owner or Engineer.
- B. If one or more of the events identified in Paragraph 16.02.A occurs, then after giving Contractor (and any surety) 10 days' written notice that Owner is considering a declaration that Contractor is in default and termination of the Contract, Owner may proceed to:
 - 1. declare Contractor to be in default, and give Contractor (and any surety) written notice that the Contract is terminated; and
 - 2. enforce the rights available to Owner under any applicable performance bond.
- C. Subject to the terms and operation of any applicable performance bond, if Owner has terminated the Contract for cause, Owner may exclude Contractor from the Site, take possession of the Work, incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, and complete the Work as Owner may deem expedient.
- D. Owner may not proceed with termination of the Contract under Paragraph 16.02.B if Contractor within 7 days of receipt of notice of intent to terminate begins to correct its failure to perform and proceeds diligently to cure such failure.
- E. If Owner proceeds as provided in Paragraph 16.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds the cost to complete the Work, including all related claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects,

attorneys, and other professionals) sustained by Owner, such excess will be paid to Contractor. If the cost to complete the Work including such related claims, costs, losses, and damages exceeds such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this paragraph, Owner shall not be required to obtain the lowest price for the Work performed.

- F. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue, or any rights or remedies of Owner against Contractor or any surety under any payment bond or performance bond. Any retention or payment of money due Contractor by Owner will not release Contractor from liability.
- G. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 6.01.A, the provisions of that bond will govern over any inconsistent provisions of Paragraphs 16.02.B and 16.02.D.

16.03 *Owner May Terminate for Convenience*

- A. Upon 7 days' written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):
 - 1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;
 - 2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses; and
 - 3. other reasonable expenses directly attributable to termination, including costs incurred to prepare a termination for convenience cost proposal.
- B. Contractor shall not be paid for any loss of anticipated profits or revenue, post-termination overhead costs, or other economic loss arising out of or resulting from such termination.

16.04 *Contractor May Stop Work or Terminate*

- A. If, through no act or fault of Contractor, (1) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (2) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (3) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon 7 days' written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the contract and recover from Owner payment on the same terms as provided in Paragraph 16.03.
- B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, 7 days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The

provisions of this paragraph are not intended to preclude Contractor from submitting a Change Proposal for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this paragraph.

ARTICLE 17—FINAL RESOLUTION OF DISPUTES

17.01 *Methods and Procedures*

- A. *Disputes Subject to Final Resolution:* The following disputed matters are subject to final resolution under the provisions of this article:
1. A timely appeal of an approval in part and denial in part of a Claim, or of a denial in full, pursuant to Article 12; and
 2. Disputes between Owner and Contractor concerning the Work, or obligations under the Contract Documents, that arise after final payment has been made.
- B. *Final Resolution of Disputes:* For any dispute subject to resolution under this article, Owner or Contractor may:
1. elect in writing to invoke the dispute resolution process provided for in the Supplementary Conditions;
 2. agree with the other party to submit the dispute to another dispute resolution process; or
 3. if no dispute resolution process is provided for in the Supplementary Conditions or mutually agreed to, give written notice to the other party of the intent to submit the dispute to a court of competent jurisdiction.

ARTICLE 18—MISCELLANEOUS

18.01 *Giving Notice*

- A. Whenever any provision of the Contract requires the giving of written notice to Owner, Engineer, or Contractor, it will be deemed to have been validly given only if delivered:
1. in person, by a commercial courier service or otherwise, to the recipient's place of business;
 2. by registered or certified mail, postage prepaid, to the recipient's place of business; or
 3. by e-mail to the recipient, with the words "Formal Notice" or similar in the e-mail's subject line.

18.02 *Computation of Times*

- A. When any period of time is referred to in the Contract by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

18.03 *Cumulative Remedies*

- A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract. The provisions of this paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

18.04 *Limitation of Damages*

- A. With respect to any and all Change Proposals, Claims, disputes subject to final resolution, and other matters at issue, neither Owner nor Engineer, nor any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, shall be liable to Contractor for any claims, costs, losses, or damages sustained by Contractor on or in connection with any other project or anticipated project.

18.05 *No Waiver*

- A. A party's non-enforcement of any provision will not constitute a waiver of that provision, nor will it affect the enforceability of that provision or of the remainder of this Contract.

18.06 *Survival of Obligations*

- A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract, as well as all continuing obligations indicated in the Contract, will survive final payment, completion, and acceptance of the Work or termination of the Contract or of the services of Contractor.

18.07 *Controlling Law*

- A. This Contract is to be governed by the law of the state in which the Project is located.

18.08 *Assignment of Contract*

- A. Unless expressly agreed to elsewhere in the Contract, no assignment by a party to this Contract of any rights under or interests in the Contract will be binding on the other party without the written consent of the party sought to be bound; and, specifically but without limitation, money that may become due and money that is due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract.

18.09 *Successors and Assigns*

- A. Owner and Contractor each binds itself, its successors, assigns, and legal representatives to the other party hereto, its successors, assigns, and legal representatives in respect to all covenants, agreements, and obligations contained in the Contract Documents.

18.10 *Headings*

- A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.



*Department of Health
and Human Services*

*Maine People Living
Safe, Healthy and Productive Lives*

Department of Health and Human Services
Maine Center for Disease Control and Prevention
286 Water Street
11 State House Station
Augusta, Maine 04333-0011
Tel: (207) 287-2070; Fax: (207) 287-4172
TTY Users: Dial 711 (Maine Relay)

DWSRF SUPPLEMENTAL GENERAL CONDITIONS FOR DISTRIBUTION PROJECTS

PURPOSE: The DWSRF Supplemental General Conditions are written to ensure that State and Federal funding and project requirements are included in DWSRF construction contract documents. Projects to utilize this General Condition set include all Distribution projects whose primary purpose is the installation, rehabilitation or replacement of water distribution or transmission mains. Other projects should utilize: DWSRF Supplemental General Conditions For Non-Distribution Projects. Note: Co-Funded projects may require an alternate General Condition set - contact your SRF Project Manager for clarification if needed.

ORIGINATOR/OWNER: DWP DWSRF Staff/Chief Engineer

PROCEDURE:

1. All contents of the DWSRF Supplemental General Conditions in this document must be included in DWSRF funded construction contract specification documents for projects and shall be put out for public bid.
2. It is helpful to incorporate the complete DWSRF Supplemental General Conditions documented here into a specification document, yet as long as all of the conditions are present in the specification document, the complete set of conditions described below do not need to be included as shown.

Specifically, when other sources are funding portions of a construction project funded also by DWSRF, as long as each item in the DWSRF supplemental general conditions is included in the specifications document, there is no need to duplicate conditions within the specifications document.

3. When questions arise regarding a component of these supplemental general conditions, the public water system or their engineer should contact their DWP DWSRF Project Manager to discuss the issue first. A DWSRF Manager will assist with decision making as needed.

ASSOCIATED DOCUMENTS:

- DWSRF Project Management Guidance Manual
- State of Maine Rules Relating to Drinking Water State Revolving Loan fund

SUPERSEDED DOCUMENTS: All previously undocumented versions of this document

RETENTION: This document is retained per DWP Record Retention Schedules

Title: DWSRF Supplemental General Conditions for Distribution Projects

SOP ID: DWP0306

Revision:

REVISION LOG:

Section	Page	Rev.	Date	Description Of Change	Approved by:
		Original	8-15-12		Norm Lamie
MBE/WBE	5	A	3-1-2013	MBE/WBE goals change from 1.3% and 3.7% to 0.64% and 1.64% respectively.	Norm Lamie
DBE, Davis Bacon, AIS, Change in Work and Work Price.	3, 11, 5-7, 9,12,14	B	7-28-15	Change WBE/MBE to DBE and added new requirements and reference to EPA documents. Modified Davis Bacon description. Added American Iron & Steel requirements. Added list of related info and forms. Removed "Bid Protest" and "Claims or Disputes" or Disputes sections which are covered by EJCDC. Included that Change Orders shall require DHHS approval.	Norm Lamie
DBE Related Info & Forms	5-6 13	C	3-18-16	Changed "EPA" to "DWP" on the titles of the 6100-2,3,4 forms described in the section on DBEs.	Nathan Saunders
Appendix A		D	3-24-16	FROMS: Added Appendix Documents: Forms 6100-4,3,2, Progress Rpt of DBE Subcontractor Utilization, Weekly Payroll Labor Stds Compliance Review, AIS Certificaton	Nathan Saunders
		E	1-24-17	Updated EJCDC document #s and names	Nathan Saunders
		F	11-28-17	Added Executive Order 12549 on Debarment and Suspension	Nathan Saunders
Appendix A and Appendix B		G	2-12-18	Change Appendix A to Appendix B to enable adding .pdf forms at the end of the document. Added Wage Rate Requirements as Appendix A.	Nathan Saunders
Appendix B		H	3-21-19	Added Deminimus Tracking Form to Appendix B	Nathan Saunders
General Conditions	15	J	1-5-2021	Added Federal requirement: "Prohibition on Certain Telecommunications and Video Surveillance Services or Equipment"	Nathan Saunders
Appendix B		K	4-7-2021	Updated all forms to be generic SRF instead of DWSRF in order to make forms for DWP and DEP the same, specifically valuable for working MDOT projects with both DWP and DEP work involved.	Nathan Saunders
General Conditions	3, 11	L	3-23-2022	Added EO 14026	McKenzie Parker
General Conditions Appendix B Appendix C		Created separate condition set to align with BIL requirements on Equiv. projects. Sub-division of DWP0151	4-6-2023	Removed EO14026, Removed AIS Requirements, Added BABA Reqs Added BIL project Sign, Updated Definition of Equivalency	McKenzie Parker

DWSRF SUPPLEMENTAL GENERAL CONDITIONS

The provisions of the Drinking Water State Revolving Loan Fund (DWSRF) Supplemental General Conditions as described below change, amend, or supplement the General Conditions and shall supersede any conflicting provisions of the CONTRACT. These provisions shall be used in conjunction with the most recent version of EJCDC documents C-700 (Standard General Conditions) and C-520 (Agreement between Owner and Contractor), both the Funding Agency version. All provisions of the General Conditions, which are not changed, amended, or supplemented, remain in full force.

Notice to Bidders

Any person interested in Bidding on this contract should thoroughly familiarize themselves with these DWSRF Supplemental General Conditions. Failure to comply with any of these conditions may result in the Bidder being determined non-responsive and therefore, not entitled to the award of this contract.

NOTE: In the ADVERTISEMENT TO BIDDERS, the following language should be used making all Bidders aware of the DHHS Special conditions.

Bid Bond

A certified check or bank draft payable to the OWNER or a satisfactory Bid Bond executed by the Bidder and a Surety Company in the equal to five percent (5%) of the Bid shall be submitted with each bid. No bid may be withdrawn for at least 60 days after receipt of bids unless released by the owner.

Disadvantaged Business Enterprise Requirements

Each Bidder shall take notice special notice of the Guidance for use of Disadvantaged Business Enterprises in the DWSRF Supplemental General Conditions. Failure to complete these requirements may result in finding that the Bidder is nonresponsive and therefore, not eligible to awarded this contract. Complete requirements are located in the Bid Documents.

Nondiscrimination in Employment and Labor Standards

Bidders on this work will be required to comply with the President's Executive Order No. 11246 and amendments and supplements to that Order. The requirements for Bidders and CONTRACTORS under this Order are located in the DWSRF Supplemental General Conditions.

Federal Requirements

The CONTRACTOR must comply with the Department of Labor Regulations relating to Copeland "Anti-Kickback Act (18 U.S.C. 874) as supplemented by 29 CFR part 3, Contract Work Hours and Safety Standards Act (40 U.S.C. 327-330) as supplemented by 29 CFR part 5, Occupational Safety and Health Standards (OSHA) (29 CFR part 1910)

The CONTRACTOR must comply with all applicable standards, orders, or requirements issued under section 306 of the Clean Air Act (42 U.S.C. 1857(h)), section 508 of the Clean Water Act (33 U.S.C. 1368), Safe Drinking Water Act, Executive Order 11738, and the Environmental Protection Agency regulations (40 CFR Part 15).

The CONTRACTOR must comply with all permits, restrictions and conditions, issued for the PROJECT by Federal Cross-cutting Authorities.

Disclaimer

Any contract awarded under this Advertisement to Bidders is expected to be funded in part by a Maine Drinking Water State Revolving Fund loan. Neither the State of Maine nor any of its departments, agencies, or employees is, or will be, party to the CONTRACT.

NOTE: The following language shall be added to the INFORMATION FOR BIDDERS section of the specifications:

Bonding and Insurance

Bidders must furnish a bid guarantee equivalent to five percent (5%) of the bid price. In addition the CONTRACTOR awarded a construction contract must furnish performance and payment bonds, each of which shall be in an amount not less than 100 percent of the contract price. CONTRACTORS shall obtain such construction insurance (e.g., fire and extended coverage, workmen's compensation, public liability and property damage, and "all risk" builders risk) as is customary and appropriate.

Manufacturer's Experience

Wherever it may be written that an equipment manufacturer must have a specified period of experience with his product or equipment, who does not meet the specified experience period, can be considered if the equipment supplier or manufacturer is willing to provide a bond or cash deposit for the duration of the specified time period which will guarantee replacement of that equipment in the event of failure.

Sales Tax

This PROJECT is exempt from State Sales and Use or Excise Taxes to the extent allowed by law.

Each system must determine whether or not the Sales Tax paragraph is applicable to its project.

Safety and Health Regulations

This PROJECT is subject to all the Safety and Health Regulations (CFR 29 Part 1926 and all subsequent amendments) as promulgated by the US. Department of Labor on June 24, 1974. CONTRACTORS are urged to become familiar with the requirements of these regulations.

Nondiscrimination in Employment

- a. Contracts for work under this proposal will obligate the CONTRACTORS and the SUBCONTRACTORS not to discriminate in employment practices.
- b. Bidders must submit with their initial bid a signed statement as to whether they have previously performed work subject to the President's Executive Order No. 11246, or any preceding similar Executive Order.
- c. Bidders must, if requested, submit a compliance report concerning their employment practices and policies in order to maintain their eligibility to receive the award of the contract.
- d. Successful bidders must, if requested, submit a list of all SUBCONTRACTORS who will perform work on the PROJECT, and written signed statements from authorized agents of labor pools with which they will or may deal for employees on the work together with supporting information to the effect that such labor pools' practices and policies are in conformity with Executive Order No. 11246; that they will affirmatively cooperate in or offer no hindrance to the recruitment, employment, and equal treatment of employees seeking employment and performing work under the contract or, a certification as to what efforts have been made to secure such statements when such agents or labor pools have failed or refused to furnish them prior to award of the contract.

- e. Successful bidders must be prepared to comply in all respects with the contract provisions regarding nondiscrimination.

SRF Disadvantaged Business Enterprises (DBE) Program

“The Contractor shall not discriminate on the basis of race, color, national origin or sex in the performance of this contract. The Contractor shall carry out applicable requirements of 40 CFR part 33, Disadvantaged Business Enterprises (DBE), in the award and administration of subcontracts. Failure by the Contractor to carry out these requirements is a material breach of this contract which may result in the termination of this contract or other legally available remedies.

The goals for this project are a minimum of 0.64% certified Minority Business Enterprise (MBE) and a minimum of 1.64% certified Women’s Business Enterprise (WBE) participation. Lists of certified businesses may be found on the following internet websites: EPA Office of Small and Disadvantaged Business Utilization (OSDBU), State of Maine Department of Transportation (DOT), and the United States Small Business Administration (SBA).

The contractor must maintain all records documenting its compliance with the requirements of this part, including documentation of its good faith efforts (such as copies of solicitation letters and emails) and data relied upon in formulating its fair share objectives.

1. During the bidding period, the Contractor is required to make the following good faith efforts if they will be awarding subcontracts:
 - (a) Ensure DBEs are made aware of contracting opportunities to the fullest extent practicable through outreach and recruitment activities. This will include placing DBEs on solicitation lists and soliciting them whenever they are potential sources.
 - (b) Make information on forthcoming opportunities available to DBEs and arrange time frames for contracts and establish delivery schedules, where the requirements permit, in a way that encourages and facilitates participation by DBEs in the competitive process. This includes, whenever possible, posting solicitations for bids or proposals for a minimum of 30 calendar days before the bid or proposal closing date.
 - (c) Consider in the contracting process whether firms competing for large contracts could subcontract with DBEs. This will include dividing total requirements when economically feasible into smaller tasks or quantities to permit maximum participation by DBEs in the competitive process.
 - (d) Encourage contracting with a consortium of DBEs when a contract is too large for one of these firms to handle individually.
 - (e) Use the services and assistance of the SBA and the Minority Business Development Agency of the Department of Commerce.
 - (f) Employ the good faith efforts described above even if the prime contractor has achieved its fair share objectives under subpart D of this part.
2. The Contractor must comply with the following provisions when submitting their bid:
 - (a) The contractor must complete and submit DWP Form 6100–4, ‘DBE Program Subcontractor Utilization Form’ (**See Appendix B**) as part of the prime contractor’s bid or proposal package to the Owner. Note, only DBE subcontractors should be listed. If no DBE subcontractors are to be used, the contractor must still complete and submit the form.

The contractor must have each of its proposed DBE subcontractors complete the DWP Form 6100–3, ‘DBE Program Subcontractor Performance Form’ (**See Appendix B**). The completed forms must be submitted as part of the prime contractor’s bid or proposal package to the Owner.
3. Prior to contract award, as the Successful Bidder, the Contractor must comply with the following provisions:
 - (a) The contractor must submit to the Owner documentation of its good faith efforts (such as copies of solicitation letters and emails) and data relied upon in formulating its fair share objectives. Solicitation documentation must include proof of receipt. The records must be submitted to the Owner even if the goals were met.

(b) The contractor must submit to the Owner a bidders list of all firms that bid or quote on subcontracts, including both MBE/WBEs and non-MBE/WBEs. The purpose of a bidders list is to provide contractors who conduct competitive bidding with as accurate a database as possible about the universe of MBE/WBE and non-MBE/WBE subcontractors. The list must include the following information:

- (1) Entity's name with point of contact;
- (2) Entity's mailing address, telephone number, and e-mail address;
- (3) The procurement on which the entity bid or quoted, and when; and
- (4) Entity's status as an MBE/WBE or non-MBE/WBE.

4. Following contract award, the Contractor must comply with the following additional provisions:

(a) The contractor must provide DWP Form 6100–2, ‘DBE Program Subcontractor Participation Form’ (See **Appendix B**) to all DBE subcontractors listed on Form 6100-4. DWP Form 6100–2 gives a DBE subcontractor the opportunity to describe the work the DBE subcontractor received from the prime contractor, how much the DBE subcontractor was paid and any other concerns the DBE subcontractor might have during the course of the project, for example, reasons why the DBE subcontractor believes it was terminated by the prime contractor. If DBE subcontractors choose to complete this form, the completed form should be sent directly to the “Contract Administrator” identified in the Preconstruction Meeting.

Complete the DWSRF DWP Progress Report of DBE Subcontractor Utilization Form (See **Appendix B**) for all contractor pay applications whether or not they include invoiced amounts from DBE subcontractors. The progress report shall be attached to the corresponding pay application for processing through the Owner.

Pay subcontractors for satisfactory performance no more than 30 days from the prime contractor's receipt of payment from the Owner.

d Notify the Owner in writing prior to any termination of a DBE subcontractor for convenience by the prime contractor.

e If a DBE subcontractor fails to complete work under the subcontract for any reason, the prime contractor must employ the good faith efforts described above if soliciting a replacement subcontractor. Documentation of good faith efforts shall be submitted to the Owner upon request.”

Build America, Buy America (BABA) Act Requirements

The Contractor acknowledges to and for the benefit of the Owner and the the Funding Authority that it understands the goods and services under this Agreement are being funded with federal monies and have statutory requirements commonly known as “Build America, Buy America;” that requires all of the iron and steel, manufactured products, and construction materials used in the project to be produced in the United States (“Build America, Buy America Requirements”) including iron and steel, manufactured products, and construction materials provided by the Contactor pursuant to this Agreement. The Contractor hereby represents and warrants to and for the benefit of the Owner and Funding Authority (a) the Contractor has reviewed and understands the Build America, Buy America Requirements, (b) all of the iron and steel, manufactured products, and construction materials used in the project will be and/or have been produced in the United States in a manner that complies with the Build America, Buy America Requirements, unless a waiver of the requirements is approved, and (c) the Contractor will provide any further verified information, certification or assurance of compliance with this paragraph, or information necessary to support a waiver of the Build America, Buy America Requirements, as may be requested by the Owner or the Funding Authority. Notwithstanding any other provision of this Agreement, any failure to comply with this paragraph by the Contractor shall permit the Owner or Funding Authority to recover as damages against the Contractor any loss, expense, or cost (including without limitation attorney’s fees) incurred by the Owner or Funding Authority resulting from any such failure (including without limitation any impairment or loss of funding, whether in whole or in part, from the Funding Authority or any damages owed to the Funding Authority by the Owner). If the Contractor has no direct contractual privity with the Funding Authority, as a lender or awardee to the Owner for the funding of its project, the Owner and the Contractor agree that the Funding Authority is a third-party beneficiary and neither this paragraph (nor any other provision of this Agreement necessary to give this paragraph force or effect) shall be amended or waived without the prior written consent of the Funding Authority.

The Owner shall maintain files on the project site for Build America, Buy America (BABA) manufacturer certifications. The Contractor and subcontractors shall provide step manufacturer certifications to the Owner for each BABA item delivered to the site. The files shall be made available to State and Federal officials for inspection upon request.

The Contractor and its subcontractors shall submit to the Owner, an BABA Compliance Certification (**See Appendix B**) prior to the project Preconstruction Meeting. The Owner, shall in turn, submit this certification from the Contractor, with their BABA Compliance Certification (**See Appendix B**), to the State at the project Preconstruction Meeting.

The nationwide waiver to the BABA law permits the use of products when they occur in de minimis components of such projects funded by the Act that may otherwise be prohibited under the Act. Funds used for such de minimis components cumulatively may comprise no more than a total of 5 percent of the total cost of the project. It is the State's interpretation that all DWSRF projects will contain components that might not comply with the law and therefore it is likely that the Owner will use the de minimis waiver. The Contractor is required to provide the necessary documentation. Owners should, in consultation with their contractors, determine the items to be covered by this waiver, must retain relevant documentation (i.e., invoices) as to those items in their project files, and must summarize in reports the types and/or categories of items to which this waiver is applied, the total cost of incidental components covered by the waiver for each type or category, and the calculations by which they determined the total cost of the project. The Owner shall maintain files on the project site for this documentation. The files shall be made available to State and Federal officials for inspection upon request.

Additional information regarding the BABA requirements can be found on this website:
<https://www.epa.gov/cwsrf/build-america-buy-america-baba>

Notice to Labor Union or Other Organization of Workers

Nondiscrimination in Employment

To: _____
(Name of Union or organization of workers)

The undersigned currently holds contract(s) with _____
(Name of Applicant)

involving funds or credit of the U.S. Government of (a) subcontract(s) with a prime CONTRACTOR holding such contract(s).

You are advised that under the provisions of the above contact(s) or subcontract(s) and in accordance with Executive Order 11246, dated September 24, 1965, the undersigned is obliged not to discriminate against any employee or applicant for employment because of race, color, creed, or national origin. This obligation not to discriminate in employment includes, but is not limited to the following:

HIRING, PLACEMENT, UPGRADING, TRANSFER, OR DEMOTION

RECRUITMENT, ADVERTISING, OR SOLICITATION FOR

EMPLOYMENT TRAINING DURING EMPLOYMENT, RATES OF

PAY OR OTHER FORMS OF COMPENSATION, SELECTION FOR TRAINING

INCLUDING APPRENTICESHIP, LAYOFF, OR TERMINATION.

This notice is furnished to you pursuant to the provisions of the above contract(s) or subcontract(s) and Executive Order 11246.

COPIES OF THIS NOTICE WILL BE POSTED BY THE UNDERSIGNED IN CONSPICUOUS PLACES AVAILABLE TO EMPLOYEES OR APPLICANT FOR EMPLOYMENT.

/s/ _____
(Contractor or Subcontractor)

(Date)

Contractor's and Subcontractor's Insurance

The CONTRACTOR shall not commence work under this contract until he has obtained all the insurance required hereunder and the OWNER has approved such insurance, nor shall the CONTRACTOR allow any SUBCONTRACTOR to commence work on his subcontract until all similar insurance required of the SUBCONTRACTOR has been so obtained and approved. Approval of the insurance by the OWNER shall not relieve or decrease the liability of the CONTRACTOR hereunder.

Operations under the CONTRACT DOCUMENTS, whether such operations be by himself or by any SUBCONTRACTOR under him, requires insurance to be written with a limit of liability of not less than \$1,000,000 for all damages arising out of bodily injury, including death, at any time resulting therefore, sustained by any one person in any one accident; and a limit of liability of not less than \$1,000,000 aggregate for any such damages sustained by two or more persons in any one accident. Insurance shall be written with a limit of liability of not less than \$500,000 for all property damage sustained by any one person in any one accident-, and a limit of liability of not less than \$500,000 aggregate for any such damage sustained by two or more persons in any one accident.

The CONTRACTOR shall acquire and maintain, if applicable, Fire and Extended Coverage insurance upon the PROJECT to the full insurable value thereof for the benefit of the OWNER, the CONTRACTOR, and SUBCONTRACTOR as their interest may appear. This provision shall in no way release the CONTRACTOR or CONTRACTOR'S surety from obligations under the CONTRACT DOCUMENTS to fully complete the PROJECT.

The CONTRACTOR shall procure and maintain, at his own expense, during the CONTRACT TIME, in accordance with the provisions of the laws of the State of Maine, Workmen's Compensation Insurance, including occupational disease provisions, for all of his employees at the site of the PROJECT and in case any work is sublet, the CONTRACTOR shall require such SUBCONTRACTOR similarly to provide Workmen's Compensation Insurance, including occupational disease provisions for all of the latter's employees unless such employees are covered by the protection afforded by the CONTRACTOR. In case any class of employees engaged in hazardous work under this contract at the site of the PROJECT is not protected under Workmen's Compensation statute, the CONTRACTOR shall provide adequate and suitable insurance for the protection of his employees not otherwise protected.

Posting Documents

The following documents must be posted and maintained by the CONTRACTOR at such place or places on the PROJECT site where employees can easily see them. The posters may be obtained, free of charge, from "Business Answers" 1-800-872-3838.

- "Notice to Labor Union or Other Organizations of Workers" (Exhibit 2)
- "Equal Employment Opportunity is the Law" poster
- "Job Safety and Health Protection" poster
- "Fair Labor Standards Act" poster
- "Employee Polygraph Protection Act" poster
- "Family and Medical Leave Act" poster (applicable to employers of 50 or more employees)
- "Notice Relative to the Regulation of Employment" (State Poster)
- "Minimum Wage" (State Poster)
- "Whistleblowers' Protection Act" (State Poster)
- "Sexual Harassment Law" (State Poster)
- "Workers Compensation" (State Poster)
- "Maine Employment Security Law" (applicable to employers who must pay unemployment tax)

“Notice to All Employees” (<http://www.dol.gov/whd/regs/compliance/posters/fedprojc.pdf>)

“Davis-Bacon” wage rates

Available from the Maine Dept. of Labor at <http://www.maine.gov/labor/posters/>.

Project Sign

The CONTRACTOR shall provide and erect PROJECT signs as detailed and specified in Appendix C (See “Project Signs for all Agencies” at www.medwp.com for sign specifications when multiple funding agencies are being utilized). The location of the signs shall be as directed by the ENGINEER. No other CONTRACTOR, SUBCONTRACTOR or material signs will be permitted on the sign. The CONTRACTOR shall maintain and keep the PROJECT signs in good condition until the work is completed when the signs will be removed. All other signs to be erected on the site shall be approved by the ENGINEER. Provide adequate supports for signs as site conditions may require and keep sign a proper distance above prevailing grade to permit public viewing. DHHS may provide an alternative method to placing a project sign for certain types of projects.

Inspection

Representatives of the OWNER and of the Department of Health and Human Services (DHHS) shall have access to the work wherever it is in preparation or progress and the CONTRACTOR shall provide proper facilities for such access and inspection.

Payment of Employees

Minimum Wages

All mechanics and laborers employed or working upon the construction site work of the PROJECT, will be paid the full amounts due at time of payment computed at wage rates not less than State or Federal Minimum Wage, whichever is higher, regardless of any contractual relationship which may be alleged to exist between the CONTRACTOR and such laborers and mechanics.

Overtime Payments

An employer is obligated to make proper wage payments under the Fair Labor Standards Act, and the Contract Work Hours Standards Act, for hours worked in excess of 40 hours in a work week. An employee must receive compensation at a rate not less than one and one-half times the regular rate of pay (basic hourly rate) for all hours worked in excess of 40 hours per week.

Davis-Bacon Wages

Davis-Bacon Wage Rates apply to projects with DWSRF funding. For Davis-Bacon wage determination purposes, work on most projects will be considered “heavy construction”. Some projects may also include work under the “building construction” category. The wage decision that is current as of ten (10) days prior to the bid opening will be applied to DWSRF funded project. The wage decision applicable to this project can be found within these project documents. It is the responsibility of the bidder to verify the applicable wage decision. For job classifications not listed in the applicable wage decision a project-specific wage determination request must be filed with the federal Department of Labor. The Drinking Water Program will provide the wage determination request application form. The Drinking Water Program must review, sign, and submit the wage determination request application. Wage determination request submittals are expected to be responded to within 30 days;

however, some responses have taken longer than this. For each job classification needed for this project not listed in the applicable wage decision the successful bidder is encouraged to identify these job classifications and notify all parties early on in the project such as during the preconstruction meeting. The contractor bears all responsibility for reimbursing workers at Davis-Bacon wage rates. This includes for job classifications not listed in the wage decision that require wage determination requests. All pay requisitions submitted that include contract expenses must include a Weekly Payroll Labor Standards Compliance Review sheet (**See Appendix**) for each week that the pay requisition covers.

For more information, see www.dol.gov/whd/govcontracts/dbra.htm

Wage Record of Contractor

The CONTRACTOR and each SUBCONTRACTOR shall keep an accurate record showing the names, social security number, and occupation of each and all laborers, workmen, and mechanics employed by them in connection with this PROJECT showing the hours worked, the title of the job, the hourly rate and the actual wages paid to each of them. A copy of such record shall be kept at the job site and shall be open at all reasonable hours to the inspection of the Bureau of Labor Standards, the OWNER, and the Department of Health and Human Services.

Retention of Payroll Records

Payroll records, including original field notes and back up material will be maintained during the course of the work by the CONTRACTOR, including payroll of each SUBCONTRACTOR for a period of three years after the completion of the PROJECT.

Violations of Labor Standards

In the event of a violation of the Overtime Payments clause the CONTRACTOR and any SUBCONTRACTOR responsible therefore shall be liable for the unpaid wages and shall be liable to the United States for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic employed in violation of the clause in the sum of \$10 for each calendar day on which such individual was required or permitted to work in excess of the standard work week of 40 hours without payment of the overtime wages.

In the event of any violation by the CONTRACTOR or SUBCONTRACTOR of the labor standards provisions of their contract, the OWNER may, after notice to the CONTRACTOR, suspend further payments until such violations have ceased.

Payment to Contractor

At least ten (10) days before each progress payment falls due (but not more often than once a month), the CONTRACTOR will submit to the ENGINEER a partial payment estimate filled out and signed by the CONTRACTOR covering the WORK performed during the period covered by the partial payment estimate and supported by such data as the ENGINEER may reasonably require. If payment is requested on the basis of materials and equipment not incorporated in the WORK but delivered and suitably stored at or near the site, the partial payment estimate shall also be accompanied by such supporting data, satisfactory to the OWNER, as will establish the OWNER'S title to the material and equipment and protect the OWNER'S interest therein, including applicable insurance. The ENGINEER will, within ten (10) days after receipt of each partial payment estimate, either indicate in writing approval of payment, and present the partial payment estimate to the OWNER, or return the partial payment estimate to the CONTRACTOR indicating in writing the reasons for refusing to approve payment.

In the latter case, the CONTRACTOR may make the necessary corrections and resubmit the partial payment estimate. The OWNER will, within ten (10) days of presentation of an approved partial payment estimate, pay the CONTRACTOR a progress payment on the basis of the approved partial payment estimate less the retainage. The retainage shall be an amount equal to ten percent (10%) of said estimate until fifty percent (50%) of the work has been completed. At fifty percent (50%) completion, further partial payments shall be made in full to the CONTRACTOR and no additional amounts retained unless the ENGINEER certifies that the job is not proceeding satisfactorily, but amounts previously retained shall not be paid to the CONTRACTOR. At fifty percent (50%) completion or any time thereafter when the progress of the WORK is not satisfactory, additional amounts may be retained but in no event shall the total retainage be more than ten percent (10%) of the value of the work completed. Upon substantial completion of the work the OWNER may retain an amount sufficient to cover the estimated cost of the work still to be completed.

The CONTRACTOR will indemnify and save the OWNER harmless from all claims growing out of the lawful demand of SUBCONTRACTORS, laborers, workmen, mechanics, material men, and furnishers of machinery and parts thereof, equipment, tools, and all supplies incurred in the furtherance of the performance of the WORK. The CONTRACTOR shall, at the OWNER'S request, furnish satisfactory evidence that all obligations of the nature designated above have been paid, discharged, or waived. This may be required on a monthly basis. If the CONTRACTOR fails to do so the OWNER may, after having notified the CONTRACTOR, either pay unpaid bills or withhold from the CONTRACTOR'S unpaid compensation a sum of money deemed reasonably sufficient to pay any and all such lawful claims until satisfactory evidence is furnished that all liabilities have been fully discharged whereupon payment to the CONTRACTOR shall be resumed in accordance with the terms of the CONTRACT DOCUMENTS, but in no event shall the provisions of this sentence be construed to impose any obligations upon the OWNER to either the CONTRACTOR, the CONTRACTOR'S Surety, or any third party. In paying any unpaid bills of the CONTRACTOR, any payment so made by the OWNER shall be considered as a payment made under the CONTRACT DOCUMENTS by the OWNER to the CONTRACTOR and the OWNER shall not be liable to the CONTRACTOR for any such payments made in good faith.

Changes in the Work

The OWNER may at any time, as the need arises, order changes within the scope of the WORK without invalidating the Agreement. If such changes increase or decrease the amount due under the CONTRACT DOCUMENTS, or the time required for performance of the WORK, an equitable adjustment shall be authorized by CHANGE ORDER.

The ENGINEER, also, may at any time, by issuing a FIELD ORDER, make changes in the details of the WORK. The CONTRACTOR shall proceed with the performance of any changes in the WORK so ordered by the ENGINEER unless the CONTRACTOR believes that such FIELD ORDER entitles the CONTRACTOR to a change in CONTRACT PRICE or TIME, or both, in which event the CONTRACTOR shall give the ENGINEER WRITTEN NOTICE thereof within seven (7) days after the receipt of the ordered change. Thereafter the CONTRACTOR shall document the basis for the change in CONTRACT PRICE or TIME within thirty (30) days.

The CONTRACTOR shall not execute such changes pending the receipt of an executed CHANGE ORDER or further instruction from the OWNER. All Change Orders shall be approved by DHHS.

Changes in Contract Price

The CONTRACT PRICE may be changed only by a CHANGE ORDER. All Change Orders shall be approved by DHHS. The value of any WORK covered by a CHANGE ORDER or of any claim for increase or decrease in the CONTRACT PRICE shall be determined by one or more of the following methods in the order of procedure listed below:

- a. Unit prices previously approved.
- b. An agreed lump sum.
- c. Time and materials

For all change order work performed under c, a fee for overhead and profit will be allowed over and above the "actual cost" of the work. For work performed by a SUBCONTRACTOR, this fee shall not exceed fifteen percent (15%) for the SUBCONTRACTOR and five percent (5%) for the general CONTRACTOR. The general CONTRACTOR'S five percent (5%) is calculated on the SUBCONTRACTOR'S actual cost before the fee is added. The total fee on "actual work" shall not exceed twenty percent (20%). For work performed by the general CONTRACTOR, this fee shall not exceed fifteen percent (15%).

The "actual cost" of work includes the reasonable cost to the CONTRACTOR of the following:

- a. materials used as part of the work;
- b. common and skilled labor and foreman only;
- c. equipment rental for the period employed directly on the work at rates not exceeding the monthly rate contained in the current "Rental Rate Blue Book for Construction Equipment (published by the Equipment Guidebook Company);
- d. additional insurance if required, to cover public liability for injury to persons and property;
- e. Workmen's Compensation Insurance, Federal Social Security and any other costs associated with payrolls and required by law.

The "actual cost" of work does not include the following:

- a. purchase or rental of small tools and buildings;
- b. CONTRACTOR'S supervision of SUBCONTRACTOR (these costs are part of fee outlined above);
- c. use of capital or premium on the bond unless the extra work includes an extension of time approved and authorized by the OWNER.
- d. overhead and profit.

Access to records

The OWNER, DHHS, Maine Municipal Bond Bank and the Comptroller General of the United States, or any of their authorized representatives, shall have the right of access to any pertinent books, documents, papers, or other records of CONTRACTORS which are pertinent to this PROJECT in order to make audits, examinations, excerpts, and transcripts.

Expiration of right of access. The rights of access shall last as long as the records are retained. The minimum retention period is three years.

Executive Order 12549--Debarment and suspension

Source: The provisions of Executive Order 12549 of Feb. 18, 1986, appear at 51 FR 6370, 3 CFR, 1986 Comp., p. 189, unless otherwise noted.

By the authority vested in me as President by the Constitution and laws of the United States of America, and in order to curb fraud, waste, and abuse in Federal programs, increase agency accountability, and ensure consistency among agency regulations concerning debarment and suspension of participants in Federal programs, it is hereby ordered that:

Section 1. (a) To the extent permitted by law and subject to the limitations in Section 1(c), Executive departments and agencies shall participate in a system for debarment and suspension from programs and activities involving Federal financial and nonfinancial assistance and benefits. Debarment or suspension of a participant in a program by one agency shall have government-wide effect.

(b) Activities covered by this Order include but are not limited to: grants, cooperative agreements, contracts of assistance, loans, and loan guarantees.

(c) This Order does not cover procurement programs and activities, direct Federal statutory entitlements or mandatory awards, direct awards to foreign governments or public international organizations, benefits to an individual as a personal entitlement, or Federal employment.

Sec. 2. To the extent permitted by law, Executive departments and agencies shall:

(a) Follow government-wide criteria and government-wide minimum due process procedures when they act to debar or suspend participants in affected programs.

(b) Send to the agency designated pursuant to Section 5 identifying information concerning debarred and suspended participants in affected programs, participants who have agreed to exclusion from participation, and participants declared ineligible under applicable law, including Executive Orders. This information shall be included in the list to be maintained pursuant to Section 5.

(c) Not allow a party to participate in any affected program if any Executive department or agency has debarred, suspended, or otherwise excluded (to the extent specified in the exclusion agreement) that party from participation in an affected program. An agency may grant an exception permitting a debarred, suspended, or excluded party to participate in a particular transaction upon a written determination by the agency head or authorized designee stating the reason(s) for deviating from this Presidential policy. However, I intend that exceptions to this policy should be granted only infrequently.

Sec. 3. Executive departments and agencies shall issue regulations governing their implementation of this Order that shall be consistent with the guidelines issued under Section 6. Proposed regulations shall be submitted to the Office of Management and Budget for review within four months of the date of the guidelines issued under Section 6. The Director of the Office of Management and Budget may return for reconsideration proposed regulations that the Director believes are inconsistent with the guidelines. Final regulations shall be published within twelve months of the date of the guidelines.

Sec. 4. There is hereby constituted the Interagency Committee on Debarment and Suspension, which shall monitor implementation of this Order. The Committee shall consist of representatives of agencies designated by the Director of the Office of Management and Budget.

Sec. 5. The Director of the Office of Management and Budget shall designate a Federal agency to perform the following functions: maintain a current list of all individuals and organizations excluded from program participation under this Order, periodically distribute the list to Federal agencies, and study the feasibility of automating the list; coordinate with the lead agency responsible for government-wide debarment and suspension of contractors; chair the Interagency Committee established by Section 4; and report periodically to the Director on implementation of this Order, with the first report due within two years of the date of the Order.

Sec. 6. The Director of the Office of Management and Budget is authorized to issue guidelines to Executive departments and agencies that govern which programs and activities are covered by this Order, prescribe government-wide criteria and government-wide minimum due process procedures, and set forth other related details for the effective administration of the guidelines.

Sec. 7. The Director of the Office of Management and Budget shall report to the President within three years of the date of this Order on Federal agency compliance with the Order, including the number of exceptions made under Section 2(c), and shall make recommendations as are appropriate further to curb fraud, waste, and abuse.

Prohibition on Certain Telecommunications and Video Surveillance Services or Equipment

This term and condition implements 2 CFR 200.216 and is effective for obligations and expenditures of EPA financial assistance funding on or after 8/13/2020. As required by 2 CFR 200.216, EPA recipients and subrecipients, including borrowers under EPA funded revolving loan fund programs, are prohibited from obligating or expending loan or grant funds to procure or obtain; extend or renew a contract to procure or obtain; or enter into a contract (or extend or renew a contract) to procure or obtain equipment, services, or systems that use covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system. As described in Public Law 115-232, section 889, covered telecommunications equipment is telecommunications equipment produced by Huawei Technologies Company or ZTE Corporation (or any subsidiary or affiliate of such entities). Recipients, subrecipients, and borrowers also may not use EPA funds to purchase: a. For the purpose of public safety, security of government facilities, physical security surveillance of critical Page 4 of 29 infrastructure, and other national security purposes, video surveillance and telecommunications equipment produced by Hytera Communications Corporation, Hangzhou Hikvision Digital Technology Company, or Dahua Technology Company (or any subsidiary or affiliate of such entities). b. Telecommunications or video surveillance services provided by such entities or using such equipment. c. Telecommunications or video surveillance equipment or services produced or provided by an entity that the Secretary of Defense, in consultation with the Director of the National Intelligence or the Director of the Federal Bureau of Investigation, reasonably believes to be an entity owned or controlled by, or otherwise connected to, the government of a covered foreign country. Consistent with 2 CFR 200.471, costs incurred for telecommunications and video surveillance services or equipment such as phones, internet, video surveillance, and cloud servers are allowable except for the following circumstances: a. Obligating or expending EPA funds for covered telecommunications and video surveillance services or equipment or services as described in 2 CFR 200.216 to: (1) Procure or obtain, extend or renew a contract to procure or obtain; (2) Enter into a contract (or extend or renew a contract) to procure; or (3) Obtain the equipment, services, or systems. Certain prohibited equipment, systems, or services, including equipment, systems, or services produced or provided by entities identified in section 889, are recorded in the System for Award Management exclusion list.

Appendix A

Wage Rate Requirements

The recipient agrees to include in all agreements to provide assistance for any construction project carried out in whole or in part with such assistance made available by a drinking water revolving loan fund as authorized by section 1452 of the Safe Drinking Water Act (42 U.S.C. 300j-12), a term and condition requiring compliance with the requirements of section 1450(e) of the Safe Drinking Water Act (42 U.S.C.300j-9(e)) in all procurement contracts and sub-grants, and require that loan recipients, procurement contractors and sub-grantees include such a term and condition in subcontracts and other lower tiered transactions All contracts and subcontracts for any construction project carried out in whole or in part with assistance made available as stated herein shall insert in full in any contract in excess of \$2,000 the contract clauses as attached hereto entitled “Wage Rate Requirements Under The Clean Water Act, Section 513 and the Safe Drinking Water Act, Section 1450(e).” This term and condition applies to all agreements to provide assistance under the authorities referenced herein, whether in the form of a loan, bond purchase, grant, or any other vehicle to provide financing for a project, where such agreements are executed on or after October 30, 2009.

Preamble

With respect to the Safe Drinking Water State Revolving Funds, EPA provides capitalization grants to each State which in turn provides sub grants or loans to eligible entities within the State. Typically, the sub recipients are municipal or other local governmental entities that manage the funds. For these types of recipients, the provisions set forth under Roman numeral I, below, shall apply. Although EPA and the State remain responsible for ensuring sub recipients’ compliance with the wage rate requirements set forth herein, those sub recipients shall have the primary responsibility to maintain payroll records as described in Section 3(ii)(A), below and for compliance as described in Section I-5.

Occasionally, the sub recipient may be a private for profit or not for profit entity. For these types of recipients, the provisions set forth in Roman Numeral II, below, shall apply. Although EPA and the State remain responsible for ensuring sub recipients’ compliance with the wage rate requirements set forth herein, those sub recipients shall have the primary responsibility to maintain payroll records as described in Section II-3(ii)(A), below and for compliance as described in Section II-5.

Requirements Under The Consolidated Appropriations Act , 2017 (P.L. 115-31) For Sub recipients That Are Not Governmental Entities :

The following terms and conditions specify how recipients will assist EPA in meeting its DB responsibilities when DB applies to EPA awards of financial assistance under the FY2017 Consolidated Appropriations Act with respect to sub recipients that are not governmental entities. If a sub recipient has questions regarding when DB applies, obtaining the correct DB wage determinations, DB provisions, or compliance monitoring, it may contact the State recipient for guidance. The recipient or sub recipient may also obtain additional guidance from DOL’s web site at <http://www.dol.gov/whd/>

Under these terms and conditions , the sub recipient must submit its proposed DB wage determinations to the State recipient for approval prior to including the wage determination in

any solicitation, contract task orders , work assignments, or similar instruments to existing contractors.

1. Applicability of the Davis - Bacon (DB) prevailing wage requirements .

Under the FY 2017 Consolidated Appropriations Act, DB prevailing wage requirements apply to the construction, alteration, and repair of treatment works carried out in whole or in part with assistance made available by a State water pollution control revolving fund and to any construction project carried out in whole or in part by assistance made available by a drinking water treatment revolving loan fund. If a sub recipient encounters a unique situation at a site that presents uncertainties regarding DB applicability, the sub recipient must discuss the situation with the recipient State before authorizing work on that site.

2. Obtaining Wage Determinations .

(a) Sub recipients must obtain proposed wage determinations for specific localities at www.sam.gov.

(b) Sub recipients shall obtain the wage determination for the locality in which a covered activity subject to DB will take place prior to issuing requests for bids, proposals, quotes or other methods for soliciting contracts (solicitation) for activities subject to DB. These wage determinations shall be incorporated into solicitations and any subsequent contracts. Prime contracts must contain a provision requiring that subcontractors follow the wage determination incorporated into the prime contract.

(i) While the solicitation remains open, the sub recipient shall monitor www.sam.gov on a weekly basis to ensure that the wage determination contained in the solicitation remains current. The sub recipients shall amend the solicitation if DOL issues a modification more than 10 days prior to the closing date (i.e. bid opening) for the solicitation. If DOL modifies or supersedes the applicable wage determination less than 10 days prior to the closing date, the sub recipients may request a finding from the State recipient that there is not a reasonable time to notify interested contractors of the modification of the wage determination. The State recipient will provide a report of its findings to the sub recipient.

(ii) If the sub recipient does not award the contract within 90 days of the closure of the solicitation, any modifications or supersedes DOL makes to the wage determination contained in the solicitation shall be effective unless the State recipient, at the request of the sub recipient, obtains an extension of the 90 day period from DOL pursuant to 29 CFR 1.6(c)(3)(iv). The sub recipient shall monitor www.sam.gov on a weekly basis if it does not award the contract within 90 days of closure of the solicitation to ensure that wage determinations contained in the solicitation remain current.

(c) If the sub recipient carries out activity subject to DB by issuing a task order, work assignment or similar instrument to an existing contractor (ordering instrument) rather than by publishing a solicitation, the sub recipient shall insert the appropriate DOL wage determination from www.sam.gov into the ordering instrument.

(d) Sub recipients shall review all subcontracts subject to DB entered into by prime contractors to verify that the prime contractor has required its subcontractors to include the applicable wage determinations.

(e) As provided in 29 CFR 1.6(f), DOL may issue a revised wage determination applicable to a sub recipient's contract after the award of a contract or the issuance of an ordering instrument if DOL determines that the sub recipient has failed to incorporate a wage determination or has used a wage determination that clearly does not apply to the contract or ordering instrument. If this occurs, the sub recipient shall either terminate the contract or ordering instrument and issue a revised solicitation or ordering instrument or incorporate DOL's wage determination retroactive to the beginning of the contract or ordering instrument by change order. The sub recipient's contractor must be compensated for any increases in wages resulting from the use of DOL's revised wage determination.

3. Contract and Subcontract provisions .

(a) The Recipient shall insure that the sub recipient(s) shall insert in full in any contract in excess of \$2,000 which is entered into for the actual construction, alteration and/or repair, including painting and decorating, of a treatment work under the CWSRF or a construction project under the DWSRF financed in whole or in part from Federal funds or in accordance with guarantees of a Federal agency or financed from funds obtained by pledge of any contract of a Federal agency to make a loan, grant or annual contribution (except where a different meaning is expressly indicated), and which is subject to the labor standards provisions of any of the acts listed in § 5.1 or the FY 2017 Consolidated and Continuing Appropriations Act, the following clauses:

(1) Minimum wages.

(i) All laborers and mechanics employed or working upon the site of the work, will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (a)(1)(iv) of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in § 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, that the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph (a)(1)(ii) of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

Sub recipients may obtain wage determinations from the U.S. Department of Labor's web site, www.s

(ii)(A) The sub recipient(s), on behalf of EPA, shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The State award official shall approve a request for an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

(1) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(2) The classification is utilized in the area by the construction industry; and

(3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(B) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the sub recipient(s) agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), documentation of the action taken and the request, including the local wage determination shall be sent by the sub recipient(s) to the State award official. The State award official will transmit the report, to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210 and to the EPA DB Regional Coordinator concurrently. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification request within 30 days of receipt and so advise the State award official or will notify the State award official within the 30-day period that additional time is necessary.

(C) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the and the sub recipient(s) do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the award official shall refer the request, and the local wage determination, including the views of all interested parties and the recommendation of the State award official, to the Administrator for determination. The request shall be sent to the EPA Regional Coordinator concurrently. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt of the request and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(D) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs (a)(1)(ii)(B) or (C) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(iv) If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs

reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

(2) Withholding. The sub recipient(s) shall upon written request of the EPA Award Official or an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor under this contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the (Agency) may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment , advance, or guarantee of funds until such violations have ceased.

(3) Payrolls and basic records.

(i) Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

(ii)(A) The contractor shall submit weekly, for each week in which any contract work is performed, a copy of all payrolls to the sub recipient, that is, the entity that receives the sub-grant or loan from the State capitalization grant recipient. Such documentation shall be available on request of the State recipient or EPA. As to each payroll copy received, the sub recipient shall provide written confirmation in a form satisfactory to the State indicating whether or not the project is in compliance with the requirements of 29 CFR 5.5(a)(1) based on the most recent payroll copies for the specified week. The payrolls shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on the weekly payrolls. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this

purpose from the Wage and Hour Division Web site at <http://www.dol.gov/whd/forms/wh347instr.htm> or its successor site.

The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the sub recipient(s) for transmission to the State or EPA if requested by EPA, the State, the contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the sub recipient(s).

(B) Each payroll submitted shall be accompanied by a “Statement of Compliance,” signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(1) That the payroll for the payroll period contains the information required to be provided under § 5.5 (a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under § 5.5 (a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;

(2) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;

(3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(C) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the “Statement of Compliance” required by paragraph (a)(3)(ii)(B) of this section.

(D) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.

(iii) The contractor or subcontractor shall make the records required under paragraph (a)(3)(i) of this section available for inspection, copying, or transcription by authorized representatives of the State, EPA or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the Federal agency or State may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

(4) Apprentices and trainees--

(i) Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the

work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractors registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(ii) Trainees. Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable

predetermined rate for the work performed until an acceptable program is approved.

(iii) Equal employment opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended and 29 CFR part 30.

(5) Compliance with Copeland Act requirements. The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.

(6) Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses contained in 29 CFR 5.5(a)(1) through (10) and such other clauses as the EPA determines may be appropriate, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.

(7) Contract termination: debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

(8) Compliance with Davis-Bacon and Related Act requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.

(9) Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and Sub recipient(s), State, EPA, the U.S. Department of Labor, or the employees or their representatives.

(10) Certification of eligibility.

(i) By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

4. Contract Provision for Contracts in Excess of \$100,000.

(a) Contract Work Hours and Safety Standards Act. The sub recipient shall insert the following clauses set forth in paragraphs (a)(1), (2), (3), and (4) of this section in full in any contract in an amount in excess of \$100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by Item 3, above or 29 CFR 4.6. As used in this paragraph, the terms laborers and mechanics include watchmen and guards.

(1) Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

(2) Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph (b)(1) of this section the contractor and any subcontractor responsible therefore shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (b)(1) of this section, in the sum of \$25 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (b)(1) of this section.

(3) Withholding for unpaid wages and liquidated damages. The sub recipient shall upon the request of the EPA Award Official or an authorized representative of the Department of Labor, withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (a)(2) of this section.

(4) Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (a)(1) through (4) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (a)(1) through (4) of this section.

(c) In addition to the clauses contained in Item 3, above, in any contract subject only to the Contract Work Hours and Safety Standards Act and not to any of the other statutes cited in 29 CFR 5.1, the Sub recipient shall insert a clause requiring that the contractor or subcontractor shall maintain payrolls and basic payroll records during the course of the work and shall preserve them for a period of three years from the completion of the contract for all laborers and mechanics, including guards and watchmen, working on the contract. Such records shall contain the name and address of each such employee, social security number, correct classifications, hourly rates of wages paid, daily and weekly number of hours worked, deductions made, and actual wages paid. Further, the Sub recipient shall insert in any such contract a clause providing that the records to be maintained under this paragraph shall be made available by the contractor or subcontractor for inspection, copying, or transcription by authorized representatives of the (write the name of agency) and the Department of Labor, and the contractor or subcontractor will permit such representatives to interview employees during working hours on the job.

5. Compliance Verification

(a) The sub recipient shall periodically interview a sufficient number of employees entitled to DB prevailing wages (covered employees) to verify that contractors or subcontractors are paying the

appropriate wage rates. As provided in 29 CFR 5.6(a)(3), all interviews must be conducted in confidence. The sub recipient must use Standard Form 1445 (SF 1445) or equivalent documentation to memorialize the interviews. Copies of the SF 1445 are available from EPA on request.

(b) The sub recipient shall establish and follow an interview schedule based on its assessment of the risks of noncompliance with DB posed by contractors or subcontractors and the duration of the contract or subcontract. Sub recipients must conduct more frequent interviews if the initial interviews or other information indicated that there is a risk that the contractor or subcontractor is not complying with DB. Sub recipients shall immediately conduct interviews in response to an alleged violation of the prevailing wage requirements. All interviews shall be conducted in confidence."

(c). The sub recipient shall periodically conduct spot checks of a representative sample of weekly payroll data to verify that contractors or subcontractors are paying the appropriate wage rates. The sub recipient shall establish and follow a spot check schedule based on its assessment of the risks of noncompliance with DB posed by contractors or subcontractors and the duration of the contract or subcontract. At a minimum, if practicable the sub recipient should spot check payroll data within two weeks of each contractor or subcontractor's submission of its initial payroll data and two weeks prior to the completion date the contract or subcontract. Sub recipients must conduct more frequent spot checks if the initial spot check or other information indicates that there is a risk that the contractor or subcontractor is not complying with DB . In addition, during the examinations the sub recipient shall verify evidence of fringe benefit plans and payments there under by contractors and subcontractors who claim credit for fringe benefit contributions.

(d). The sub recipient shall periodically review contractors and subcontractors use of apprentices and trainees to verify registration and certification with respect to apprenticeship and training programs approved by either the U.S Department of Labor or a state, as appropriate, and that contractors and subcontractors are not using disproportionate numbers of, laborers, trainees and apprentices. These reviews shall be conducted in accordance with the schedules for spot checks and interviews described in Item 5(b) and (c) above.

(e) Sub recipients must immediately report potential violations of the DB prevailing wage requirements to the EPA DB contact listed above and to the appropriate DOL Wage and Hour District Office listed at <http://www.dol.gov/whd/america2.htm>

Appendix B
FORMS



Disadvantaged Business Enterprise Program (DBE) Subcontractor Utilization Form

This form is intended to capture the prime contractor's actual and/or anticipated use of identified certified DBE¹ subcontractors² and the estimated dollar amount of each subcontract. An EPA Financial Assistance Agreement Recipient must require its prime contractors to complete this form and include it in the bid or proposal package. Prime contractors should also maintain a copy of this form on file.

Prime Contractor Name		Project Name	
Bid /Proposal No.	Assistance Agreement ID No. (if known)	Point of Contact	
Address			
Telephone No.		Email Address	
Issuing/Funding Entity:			

I have identified potential DBE certified subcontractors	<input type="checkbox"/> YES	<input type="checkbox"/> NO
--	------------------------------	-----------------------------

If yes, please complete the table below. If no, please explain:

Subcontractor Name/ Company Name	Company Address/Phone/Email	Est. Dollar Amt.	Currently DBE Certified?

Continue on back if needed

¹A DBE is a Disadvantaged, Minority, or Woman Business Enterprise that has been certified by an entity from which EPA accepts certifications as described in 40 CFR 33.204-33.205 or certified by EPA. EPA accepts certifications from entities that meet or exceed EPA certification standards as described in 40 CFR 33.202.

²Subcontractor is defined as a company, firm, joint venture, or individual who enters into an agreement with a contractor to provide services pursuant to an EPA award or financial assistance.



State Revolving Loan Fund

Disadvantaged Business Enterprise Program (DBE) Subcontractor Utilization Form

I certify under penalty of perjury that the forgoing statements are true and correct. Signing this form does not signify a commitment to utilize the subcontractors above. I am aware that in the event of a replacement of a subcontractor, I will adhere to the replacement requirements set forth in 40 CFR Section 33.202 (c).

Prime Contractor Signature	Print Name
Title	Date



State Revolving Loan Fund

Disadvantaged Business Enterprise Program (DBE) Subcontractor Performance Form

This form is intended to capture the DBE¹ subcontractor's² description of work to be performed and the price of the work submitted to the prime contractor. An EPA Financial Assistance Agreement Recipient must require its prime contractor to have its DBE subcontractors complete this form and include all completed forms in the prime contractors bid or proposal package.

Subcontractor Name		Project Name	
Bid /Proposal No.	Assistance Agreement ID No. (if known)	Point of Contact	
Address			
Telephone No.		Email Address	
Prime Contractor Name		Issuing/Funding Entity:	

Contract Item Number	Description of Work Submitted to the Prime Contractor Involving Construction, Services, Equipment or Supplies	Price of Work Submitted to the Prime Contractor
DBE Certified By: <input type="checkbox"/> DOT <input type="checkbox"/> SBA <input type="checkbox"/> Other: _____		Meets/exceeds EPA certification standards? <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> Unknown

¹A DBE is a Disadvantaged, Minority, or Woman Business Enterprise that has been certified by an entity from which EPA accepts certifications as described in 40 CFR 33.204-33.205 or certified by EPA. EPA accepts certifications from entities that meet or exceed EPA certification standards as described in 40 CFR 33.202.

²Subcontractor is defined as a company, firm, joint venture, or individual who enters into an agreement with a contractor to provide services pursuant to an EPA award of financial assistance.



State Revolving Loan Fund

Disadvantaged Business Enterprise Program (DBE) Subcontractor Performance Form

I certify under penalty of perjury that the forgoing statements are true and correct. Signing this form does not signify a commitment to utilize the subcontractors above. I am aware of that in the event of a replacement of a subcontractor, I will adhere to the replacement requirements set forth in 40 CFR Part 33 Section 33.202 (c).

Prime Contractor Signature	Print Name
Title	Date

Subcontractor Signature	Print Name
Title	Date



Disadvantaged Business Enterprise Program (DBE) Subcontractor Participation Form

An EPA Financial Assistance Agreement Recipient must require its prime contractors to provide this form to its DBE subcontractors. This form gives a DBE¹ subcontractor² the opportunity to describe work received and /or report any concerns regarding the EPA-funded project (e.g. in areas such as termination by prime contractor, late payments, etc.). The DBE subcontractor can, as an option, complete and submit this form to the DEP DBE Coordinator at any time during the project period of performance.

Subcontractor Name		Project Name	
Bid /Proposal No.	Assistance Agreement ID No. (if known)	Point of Contact	
Address			
Telephone No.		Email Address	
Prime Contractor Name		Issuing/Funding Entity:	

Contract Item Number	Description of Work Received from the Prime Contractor Involving Construction, Services, Equipment or Supplies	Amount Received by Prime Contractor

¹A DBE is a Disadvantaged, Minority, or Woman Business Enterprise that has been certified by an entity from which EPA accepts certifications as described in 40 CFR 33.204-33.205 or certified by EPA. EPA accepts certifications from entities that meet or exceed EPA certification standards as described in 40 CFR 33.202.

²Subcontractor is defined as a company, firm, joint venture, or individual who enters into an agreement with a contractor to provide services pursuant to an EPA award of financial assistance.



State Revolving Loan Fund

**Disadvantaged Business Enterprise Program
(DBE) Subcontractor Participation Form**

Please use the space below to report any concerns regarding the above EPA-funded project:

Subcontractor Signature	Print Name
Title	Date



State Revolving Loan Fund

Disadvantaged Business Enterprise Program (DBE)

PROGRESS REPORT OF DBE SUBCONTRACTOR UTILIZATION FORM

TO ENSURE PROMPT PAYMENT THE FOLLOWING INFORMATION MUST BE SUBMITTED WITH ALL REIMBURSEMENT REQUESTS WHETHER THEY INCLUDE INVOICED AMOUNTS FROM A QUALIFYING WBE OR MBE PARTICIPANT OR NOT:

Municipality/District: _____ SRF #: _____

Name of Project: _____ Contractor: _____

Contractor's Payment Request No. _____ Period covered by the request _____

The accompanying Reimbursement Request includes the following WBE/MBE participation:

Table with 6 columns: Name & Address of WBE/MBE firm to be paid, WBE, MBE, Source of Certification, i.e., DOT, EPA or SBA, Amount to be paid this request, Type of Work. Contains 4 rows with checkboxes for WBE and MBE.

This attachment must be signed by an authorized representative of the contractor.

Signature: _____ Date: _____

Name: _____ Title: _____

Address: _____

Phone: _____ E-Mail: _____



State Revolving Loan Fund

Owner's Davis-Bacon Compliance Report

Project Name _____ SRF Project # C230_____

Project Owner: _____

Certified Payrolls Reviewed By: _____
(Printed name of Owner's Representative)

Employee interviews have been conducted in accordance with the contract requirements. Yes No

Prime Contractor: _____

Prime Contractor's Pay Application No: _____ (Note: Only one allowed per Compliance Report)

Application Period: From _____ to _____

Check one box and sign below:

- For the application period indicated, there were no certified payrolls reported because there were no workers on the site that were subject to the Davis-Bacon and Related Acts.
- For the application period indicated, the certified payrolls are in compliance with the Davis-Bacon and Related Acts.
- For the application period indicated, the certified payrolls are not in compliance with the Davis-Bacon and Related Acts. A Compliance Report for the corrective action will be submitted ASAP.

Summary of noncompliant findings and follow up actions needed:

Owner's Representative Signature

Date



BUILD AMERICA, BUY AMERICA (BABA) ACT

In Title IX of the IIJA, Congress passed the Build America, Buy America (BABA) Act, which establishes strong and permanent domestic sourcing requirements across all Federal financial assistance programs for infrastructure.

By May 14, 2022, agencies must ensure that all applicable programs comply with section 70914 of the Act, including by the incorporation of a Buy America preference in the terms and conditions of each award with an infrastructure project. The Act requires the following Buy America preference:

- (1) All iron and steel used in the project are produced in the United States. This means all manufacturing processes, from the initial melting stage through the application of coatings, occurred in the United States.
- (2) All manufactured products used in the project are produced in the United States. This means the manufactured product was manufactured in the United States, and the cost of the components of the manufactured product that are mined, produced, or manufactured in the United States is greater than 55 percent of the total cost of all components of the manufactured product, unless another standard for determining the minimum amount of domestic content of the manufactured product has been established under applicable law or regulation.
- (3) All construction materials are manufactured in the United States. This means that all manufacturing processes for the construction material occurred in the United States.

Waivers

When necessary, recipients may apply for, and the agency may grant, a waiver from these requirements. The agency should notify the recipient for information on the process for requesting a waiver from these requirements. When the Federal agency has made a determination that one of the following exceptions applies, the awarding official may waive the application of the domestic content procurement preference in any case in which the agency determines that:

- (1) applying the domestic content procurement preference would be inconsistent with the public interest;
- (2) the types of iron, steel, manufactured products, or construction materials are not produced in the United States in sufficient and reasonably available quantities or of a satisfactory quality; or
- (3) the inclusion of iron, steel, manufactured products, or construction materials produced in the United States will increase the cost of the overall project by more than 25 percent.

The nationwide waiver to the BABA law permits the use of products when they occur in de minimis components of such projects funded by the Act that may otherwise be prohibited under the Act. Funds used for such de minimis components cumulatively may comprise no more than a total of 5 percent of the total cost of the project. The Contractor is required to provide the necessary documentation. Owners should, in consultation with their contractors, determine the items to be covered by this waiver, must retain relevant documentation (i.e., invoices) as to those items in their project files, and must summarize in reports the types and/or categories of items to which this waiver is applied, the total cost of incidental components covered by the waiver for each type or category, and the calculations by which they determined the total cost of the project. The Owner shall maintain files on the project site for this documentation. The files shall be made available to State and Federal officials for inspection upon request.



CERTIFICATION BY THE OWNER
OF COMPLIANCE WITH THE
USE OF BUILD AMERICA, BUY AMERICA ACT
enacted on May 14, 2022

(To be attached to each Utility Construction SRF requisition submitted for payment)

We, the Owner named, _____, having obtained funding from the State of Maine, State Revolving Fund (SRF), for the Utility Construction Project named _____, hereby submit to the SRF program, certification from each contractor working on the Utility Construction Project that the use of Domestic Content Procurement in the construction of the project complies with the law, or that a waiver has been obtained from the U.S. Environmental Protection Agency. Thereby, it is to the best of the Owner's knowledge that the Project is in compliance with the Build America, Buy America Act..

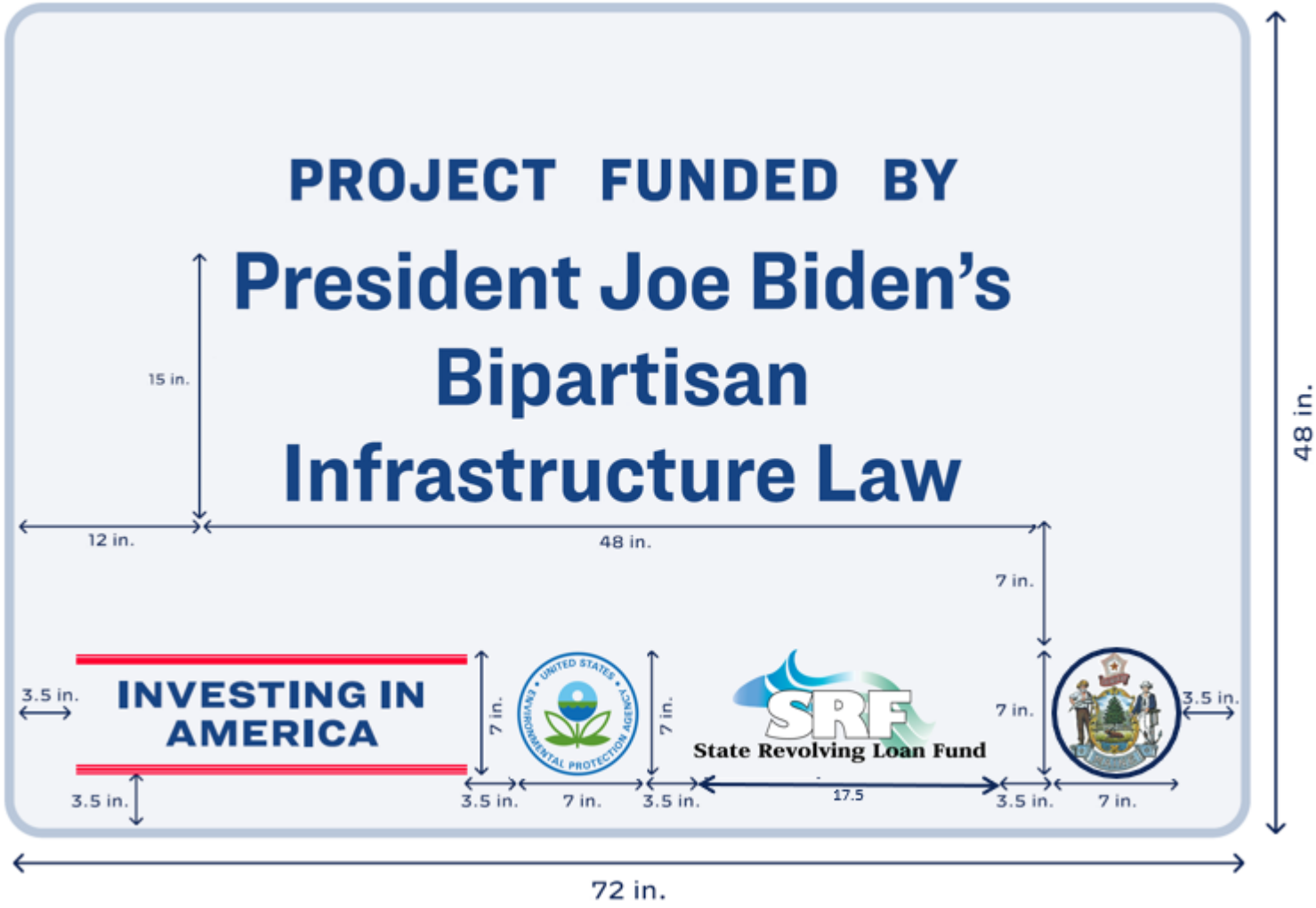
Signature of Official Printed name Date

Attachment: Certification by Contractor

Appendix C
PROJECT SIGNS

Bipartisan Infrastructure Law Signage

To be displayed on all projects with BIL funding






High Resolution Images

"Investing in America"

EPA Seal

SRF Logo

Maine State Seal

COLOR	CMYK	RGB	HEX	PMS
 Blue	83, 48, 0, 48	22 / 68 / 132	#164484	PMS 7687 C
 Red	0, 100, 81, 0	255 / 0 / 49	#FF0031	PMS 185 C
 White	2, 2, 0, 3	242 / 244 / 248	#F2F4F8	Bright White

Sign Dimensions: 4-ft x 6-ft x 3/4-in

Material: Exterior Plywood (A-B GRADE)

Font: **Arial Bold**

Temporary Construction Sign for DWSRF Projects

WHITE BACKGROUND

Project Title (include Town / District name)

Engineer:

Contractor:

Total Project Cost:

Financed by:

**DWSRF Program: Maine Department of Health and Human Services, and
Maine Municipal Bond Bank**



This institution is an equal opportunity provider

BLACK LETTERING

WAVE

BLUE, PMS 655 FADING TO 30% SCREEN
GREEN, PMS 627 @ 30% SCREEN DARKENING
TO 100% SCREEN THEN BACK TO 30% SCREEN

MINIMUM SIGN DIMENSIONS: 1200 x 2400 x 19 MM (4' x 8' x 3/4")

EXTERIOR PLYWOOD (A-B GRADE)

MINIMUM LETTERING SIZE: 5 CM (2-INCHES)

BLACK
LETTERING

WORK CHANGE DIRECTIVE NO.: [Number of Work Change Directive]

Owner: Washington Academy
Engineer: DuBois & King Inc.
Contractor:
Project: Public Water System Consolidation
Contract Name: Washington Academy Public Water System Consolidation
Date Issued: Effective Date of Work Change Directive:
Owner's Project No.:
Engineer's Project No.: 229946
Contractor's Project No.:

Contractor is directed to proceed promptly with the following change(s):

Description:

[Description of the change to the Work]

Attachments:

[List documents related to the change to the Work]

Purpose for the Work Change Directive:

[Describe the purpose for the change to the Work]

Directive to proceed promptly with the Work described herein, prior to agreeing to change in Contract Price and Contract Time, is issued due to:

Notes to User—Check one or both of the following

Non-agreement on pricing of proposed change. Necessity to proceed for schedule or other reasons.

Estimated Change in Contract Price and Contract Times (non-binding, preliminary):

Contract Price: \$ _____ [increase] [decrease] [not yet estimated].

Contract Time: _____ days [increase] [decrease] [not yet estimated].

Basis of estimated change in Contract Price:

Lump Sum Unit Price Cost of the Work Other

Recommended by Engineer

Authorized by Owner

By:

Title:

Date:

CHANGE ORDER NO.: [Number of Change Order]

Owner: Washington Academy
 Engineer: DuBois & King Inc.
 Contractor:
 Project: Public Water System Consolidation
 Contract Name: Washington Academy Public Water System Consolidation
 Date Issued: Effective Date of Change Order:

Owner's Project No.:
 Engineer's Project No.: 229946
 Contractor's Project No.:

The Contract is modified as follows upon execution of this Change Order:

Description:

[Description of the change]

Attachments:

[List documents related to the change]

Change in Contract Price	Change in Contract Times [State Contract Times as either a specific date or a number of days]
Original Contract Price: \$ _____	Original Contract Times: Substantial Completion: _____ Ready for final payment: _____
[Increase] [Decrease] from previously approved Change Orders No. 1 to No. [Number of previous Change Order]: \$ _____	[Increase] [Decrease] from previously approved Change Orders No.1 to No. [Number of previous Change Order]: Substantial Completion: _____ Ready for final payment: _____
Contract Price prior to this Change Order: \$ _____	Contract Times prior to this Change Order: Substantial Completion: _____ Ready for final payment: _____
[Increase] [Decrease] this Change Order: \$ _____	[Increase] [Decrease] this Change Order: Substantial Completion: _____ Ready for final payment: _____
Contract Price incorporating this Change Order: \$ _____	Contract Times with all approved Change Orders: Substantial Completion: _____ Ready for final payment: _____

Recommended by Engineer (if required)

Accepted by Contractor

By: _____
 Title: _____
 Date: _____

Authorized by Owner

Approved by Funding Agency (if applicable)

By: _____
 Title: _____
 Date: _____

00 73 46
Wage Determination Schedule

PART 1- GENERAL

1.1 Related Documents

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

1.2 Summary

- A. This Section includes the wage determination requirements for Contractors as issued by the State of Maine Department of Labor Bureau of Labor Standards or the United States Department of Labor.

1.3 Requirements

- A. Conform to the wage determination schedule for this project which is shown on the following page.

PART 2 - PRODUCTS (not used)

PART 3 - EXECUTION (not used)

**State of Maine
Department of Labor
Bureau of Labor Standards
Augusta, Maine 04333-0045
Telephone (207) 623-7906**

Wage Determination - In accordance with 26 MRS §1301 et. seq., this is a determination by the Bureau of Labor Standards, of the fair minimum wage rate to be paid to laborers and workers employed on the below titled project.

2025 Fair Minimum Wage Rates – Building 2 Washington County (other than 1 or 2 family homes)

<u>Occupational Title</u>	<u>Minimum Wage</u>	<u>Minimum Benefit</u>	<u>Total</u>
Brickmasons And Blockmasons	\$38.00	\$3.75	\$41.75
Bulldozer Operator	\$34.44	\$2.21	\$36.65
Carpenter	\$32.59	\$2.86	\$35.45
Cement Masons And Concrete Finisher	\$26.00	\$0.00	\$26.00
Construction And Maintenance Painters	\$26.38	\$0.25	\$26.63
Construction Laborer	\$24.00	\$1.20	\$25.20
Crane And Tower Operators	\$34.50	\$10.68	\$45.18
Crushing Grinding And Polishing Machine Operators	\$27.50	\$5.64	\$33.14
Earth Drillers - Except Oil And Gas	\$22.37	\$2.35	\$24.72
Electrical Power - Line Installer And Repairers	\$43.26	\$16.55	\$59.81
Electricians	\$38.50	\$5.29	\$43.79
Elevator Installers And Repairers	\$71.21	\$43.75	\$114.96
Loading Machine And Dragline Operators	\$25.50	\$4.99	\$30.49
Excavator Operator	\$31.38	\$5.83	\$37.21
Fence Erectors	\$20.00	\$1.23	\$21.23
Flaggers	\$20.50	\$0.40	\$20.90
Floor Layers - Except Carpet/Wood/Hard Tiles	\$26.50	\$3.83	\$30.33
Glaziers	\$21.00	\$2.39	\$23.39
Grader/Scraper Operator	\$31.00	\$6.86	\$37.86
Hazardous Materials Removal Workers	\$21.13	\$1.14	\$22.27
Heating And Air Conditioning And Refrigeration Mechanics And Installers	\$34.00	\$5.60	\$39.60
Heavy And Tractor - Trailer Truck Drivers	\$22.75	\$1.12	\$23.87
Highway Maintenance Workers	\$22.85	\$4.79	\$27.64
Industrial Machinery Mechanics	\$30.00	\$4.60	\$34.60
Industrial Truck And Tractor Operators	\$26.17	\$3.49	\$29.66
Insulation Worker - Mechanical	\$24.00	\$6.07	\$30.07
Ironworker - Ornamental	\$31.37	\$25.82	\$57.19
Light Truck Or Delivery Services Drivers	\$27.99	\$2.02	\$30.01
Millwrights	\$31.45	\$15.17	\$46.62
Mobile Heavy Equipment Mechanics - Except Engines	\$30.00	\$5.67	\$35.67
Operating Engineers And Other Equipment Operators	\$28.50	\$3.54	\$32.04
Paving Surfacing And Tamping Equipment Operators	\$28.60	\$12.03	\$40.63
Pile-Driver Operators	\$36.00	\$2.87	\$38.87
Pipe/Steam/Sprinkler Fitter	\$37.50	\$21.71	\$59.21
Pipelayers	\$27.48	\$4.72	\$32.20
Plumbers	\$32.00	\$6.69	\$38.69
Pump Operators - Except Wellhead Pumpers	\$56.03	\$34.76	\$90.79
Radio Cellular And Tower Equipment Installers	\$30.00	\$4.85	\$34.85
Reinforcing Iron And Rebar Workers	\$56.69	\$2.27	\$58.96
Riggers	\$30.50	\$8.25	\$38.75
Roofers	\$24.00	\$3.60	\$27.60
Sheet Metal Workers	\$25.75	\$6.31	\$32.06
Structural Iron And Steel Workers	\$32.02	\$24.67	\$56.69
Tapers	\$28.00	\$2.40	\$30.40
Telecommunications Equipment Installers And Repairers - Except Line Installers	\$33.44	\$6.87	\$40.31
Telecommunications Line Installers And Repairers	\$29.50	\$1.96	\$31.46

Welders are classified as the trade to which welding is incidental (e.g. welding structural steel is Structural Iron and Steel Worker)

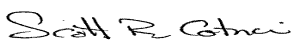
Apprentices – The minimum wage rates for registered apprentices are the rates recognized in the sponsorship agreement for registered apprentices working in the pertinent classification.

For any other specific trade on this project not listed above, contact the Bureau of Labor Standards for further clarification.

Title 26 §1310 requires that a clearly legible statement of all fair minimum wage and benefits rates to be paid the several classes of laborers, workers and mechanics employed on the construction on the public work must be kept posted in a prominent and easily accessible place at the site by each contractor and subcontractor subject to sections 1304 to 1313.

Appeal – Any person affected by the determination of these rates may appeal to the Commissioner of Labor by filing a written notice with the Commissioner stating the specific grounds of the objection within ten (10) days from the filing of these rates.

A true copy

Attest: 
Scott R. Cotnoir
Wage & Hour Director
Bureau of Labor Standards

Expiration Date: 12-31-2025

SECTION 01 1000

SUMMARY

PART 1 GENERAL

1.01 PROJECT CONTACTS

- A. Project Name: Washington Academy Public Water System Consolidation
- B. Owner's Name: Washington Academy, 66 Cutler Road, East Machias, Maine 04630
- C. Owner's Contact: Jud McBrine, Headmaster, Washington Academy, (207) 255-8301 x205.
- D. Plant Operator: Cliff Strout, Director of Facilities, Washington Academy, (207) 263-5626
- E. Engineer's Name: DuBois & King, Inc.; Noah Bussiere, 36 Penn Plaza, Bangor, Maine 04401, (207) 974-9824.
- F. Electric Utility Company: Versant Power
- G. Telephone Company: VoIP with White Label Communications & POTS with Consolidated Communications.

1.02 RELATED SECTIONS

- A. C-700 General Conditions and DWSRF Supplemental General Conditions
- B. Section 01 5250 – Field Offices
- C. Section 32 2113 – Demolition and Modifications

1.03 CONTRACT DESCRIPTION

- A. Contract Type: A single prime contract based on a Stipulated Price as described in these Contract Documents.

1.04 DESCRIPTION OF WORK

- A. The Work included in this contract is for the consolidation of the existing public and private water systems on the Washington Academy campus in East Machias, Maine. Work includes abandoning 2 drinking water wells, constructing a new water treatment building, installing new water treatment, storage and pumping facilities, and installing a new water supply and distribution system.
- B. Major work items included in this contract include, but are not limited to, the following:
 - 1. Maintaining water flows throughout the construction phase.
 - 2. Construct a new water treatment building.
 - 3. Provide and install well pump controls, water supply entrances, water treatment facilities (PFAS & chlorination), water storage tanks, a triplex VFD constant pressure pump system and controls, and related mechanical and electrical work within the water treatment building.
 - 4. Provide and install standby power at the water treatment building.

5. Construct new water supply and distribution system with connections to existing buildings.

1.05 OWNER OCCUPANCY

- A. Owner will occupy the project site throughout the construction period as required to maintain operations at the treatment facility. Contractor shall coordinate and maintain good communications with operating staff continually throughout the construction period. Contractor shall arrange work to enable operating staff to perform their duties and responsibilities to maintain the successful operation of the existing and upgraded treatment facility at all times.

1.06 Project/Site Conditions

- A. All Work must be completed without interruption of the flow of wastewater into the existing facility and without impairment of the level of treatment currently being provided.
- B. All work must be completed without interruption of the flow from the Route 66 Wastewater Collection Area that is conveyed under Ayers Brook via the Route 66 pump station.
- C. The Drawings indicate the presence of existing buried pipelines and structures based on best available information, but the Contractor shall perform whatever field testing and verification is required to allow pipeline crossings or tie-ins, excavations, or other similar work tasks to be completed in the areas of existing buried equipment systems without damage to or interruption of operation.

1.07 CONTRACTOR USE OF SITE

- A. Construction Operations: Limited to permanent and temporary easement limits and public roadways.
- B. Time Restrictions:
 1. Limit conduct of especially noisy exterior work to the hours of 8:00 a.m. to 5:30 p.m.
 2. Coordinate construction schedule and operations with Engineer.
 3. Limit work hours from 8:00 a.m. to 5:30 p.m. except for emergency work or as otherwise approved in writing by the Owner.
 4. No work shall be performed on Saturdays, Sundays, or legal holidays.
 5. Legal holidays are:
 - a. New Year's Day
 - b. President's Day
 - c. Memorial Day
 - d. Independence Day

- e. Labor Day
- f. Veteran's Day
- g. Thanksgiving Day
- h. Christmas Day

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 1300
SURVEYS AND LAYOUT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Quality Assurance.
- B. Products.

1.02 QUALITY ASSURANCE

- A. Contractor shall perform all survey work for laying out the Work and for preparing Record Drawings. Work shall be done by a qualified Surveyor, as Chief of Party, and qualified assistants experienced in this type of work.
- B. Contractor is responsible for the accuracy of his own work and shall maintain all reference points, stakes, etc., throughout the life of the Contract.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Provide all instruments, rods, measures, stakes, ribbons, nails and all other materials and equipment to perform the work of this Section.

PART 3 EXECUTION

3.01 INSPECTIONS

- A. Carefully examine the Drawings and immediately report to Engineer any error, apparent discrepancy in the data shown or omissions of data required for accurately accomplishing the Work.

3.02 LAYING OUT THE WORK

- A. Verify locations of survey control points prior to starting work.
- B. Promptly notify Engineer of any discrepancies discovered.
- C. Contractor shall locate and protect survey control and reference points.
- D. Control datum for survey is that indicated on Drawings.
- E. Promptly report to Engineer the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.
- F. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Engineer.

- G. Utilize recognized engineering survey practices.
- H. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:
 - 1. Site improvements including pavements, stakes for grading, fill and topsoil placement, utility locations, slopes, and invert elevations.
 - 2. Grid or axis for structures.
 - 3. Building foundation, column locations, and ground floor elevations.
- I. Periodically verify layouts by same means.
- J. Maintain a complete and accurate log of control and survey work as it progresses.

3.03 MEASUREMENTS

- A. Perform all surveys and make all measurements required for the Record Drawings.

3.04 FIELD NOTES AND COMPUTATIONS

- A. Make all computations necessary to establish the exact position of the Work. Maintain field notes of all ties, baselines, reference points, bench marks and other control points. Also maintain field notes of all data required to be shown on the Record Drawings.

3.05 TIES

- A. Property Monuments - Prior to any work in the vicinity of an existing property monument or marker, accurately provide at least four ties to physical objects which will not be damaged, destroyed or disturbed in the course of the Work.
- B. New Underground and Underwater Work - On all new Work which will be buried or submerged in water and will not be visible at the completion of the Work provide elevations and three ties to physical objects to facilitate the locating of such items at a later date.

3.06 REPLACEMENTS

- A. All existing and new reference points, ties, bench marks, property markers and other control points damaged, destroyed or disturbed during construction shall be reestablished and replaced.

END OF SECTION

SECTION 01 3000
ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Preconstruction meeting.
- B. Site mobilization meeting.
- C. Progress meetings.
- D. Construction progress schedule.
- E. Progress photographs.
- F. Submittals for review, information, and project closeout.
- G. Number of copies of submittals.
- H. General submittal procedures.
- I. Web-based electronic submittal procedures.

1.02 RELATED REQUIREMENTS

- A. Document 00700 - General Conditions.
- B. DWSRF Supplemental General Conditions
- C. Section 01 1000 - Summary.
- D. Section 01 7000 - Execution Requirements: Additional coordination requirements.
- E. Section 01 7800 - Closeout Submittals: Project record documents.

1.03 PROJECT COORDINATION

- A. Project Coordinator: Engineer's Construction Manager and/or Resident Project Representative.
- B. Coordinate with Owner representatives in identification of mobilization and storage areas, field office locations, site access, traffic, and parking facilities.
- C. Comply with Project Coordinator's procedures for intra-project communications; submittals, reports and records, schedules, coordination drawings, and recommendations; and resolution of ambiguities and conflicts.
- D. Comply with instructions of the Project Coordinator for use of temporary utilities and construction facilities.
- E. Make the following types of submittals to Engineer:
 - 1. Requests for interpretation.
 - 2. Requests for substitution.
 - 3. Shop drawings, product data, and samples.

4. Test and inspection reports.
5. Design data.
6. Manufacturer's instructions and field reports.
7. Applications for payment and change order requests.
8. Progress schedules.
9. Coordination drawings.
10. Closeout submittals.
11. Operation and Maintenance Manuals.
12. Record Drawings and Field Ties.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRECONSTRUCTION MEETING

- A. Engineer will schedule a meeting after Notice of Award.
- B. Attendance Required:
 1. Representative of Owner.
 2. Engineer's Manager and Resident Project Representative.
 3. Contractor's Project Manager and Superintendent.
 4. Representative of funding agency.
- C. Agenda:
 1. Execution of Owner-Contractor Agreement.
 2. Submission of executed bonds and insurance certificates.
 3. Distribution of Contract Documents.
 4. Submission of list of Subcontractors, schedule of values, and progress schedule.
 5. Designation of personnel representing the parties to Contract, funding agency, and Engineer.
 6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
 7. Scheduling.
 8. Other Contract Document or construction coordination items, as required.
- D. Engineer will record minutes and distribute copies within three days after meeting to participants, and those affected by decisions made.

3.02 SITE MOBILIZATION MEETING

- A. Owner will schedule a meeting at the Project site prior to Contractor occupancy.
- B. Attendance Required:
 - 1. Contractor's Superintendent.
 - 2. Owner Representative.
 - 3. Resident Project Representative
- C. Agenda:
 - 1. Use of premises by Owner and Contractor.
 - 2. Owner's requirements.
 - 3. Construction facilities.
 - 4. Temporary utilities.
 - 5. Security and housekeeping procedures.
- D. Resident Project Representative will record minutes and distribute copies within three days after meeting to participants, and those affected by decisions made.

3.03 PROGRESS MEETINGS

- A. Engineer will schedule and administer meetings throughout progress of the Work at two week intervals.
- B. Engineer will make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.
- C. Attendance Required: Contractor's project manager and superintendent, major Subcontractors and suppliers, Owner representative, and Engineer's project manager and Resident Project Representative.
- D. Agenda:
 - 1. Review minutes of previous meetings.
 - 2. Review of Work progress.
 - 3. Field observations, problems, and decisions.
 - 4. Identification of problems which impede planned progress.
 - 5. Review of submittals schedule and status of submittals.
 - 6. Review of off-site fabrication and delivery schedules.
 - 7. Maintenance of progress schedule.
 - 8. Corrective measures to regain projected schedules.
 - 9. Planned progress during succeeding work period.
 - 10. Coordination of projected progress.
 - 11. Maintenance of quality and work standards.

- 12. Effect of proposed changes on progress schedule and coordination.
 - 13. Other business relating to Work.
- E. Engineer will record minutes and distribute copies within three days after meeting to participants, and those affected by decisions made.
- 3.04 CONSTRUCTION PROGRESS SCHEDULE
- A. Submit preliminary schedule at the Preconstruction Meeting, defining planned operations for the first 30 days of Work, with a general outline for remainder of Work.
 - B. If preliminary schedule requires revision after review, submit revised schedule within 5 days.
 - C. Within 10 days after review of preliminary schedule, submit proposed complete schedule for review.
 - D. Submit updated schedule with each Application for Payment.
- 3.05 PROGRESS PHOTOGRAPHS
- A. A. Provide photographs of site and construction throughout progress of Work.
 - B. Take photographs each month on the following:
 - 1. Site clearing.
 - 2. Excavations.
 - 3. Final completion.
 - C. Take photographs as evidence of existing project conditions. Photos shall be stored in electronic file format, in a digital .jpg file format. Files shall be organized by date and/or activity.
 - D. Digital photo files shall be made available to the Engineer, at the Engineer's request.
 - F. Deliver all digital photo files to Engineer with project record documents. Catalog and index files in chronological sequence; provide table of contents.
- 3.06 SUBMITTALS FOR REVIEW
- A. When the following are specified in individual sections, submit them for review:
 - 1. Product data.
 - 2. Shop drawings.
 - 3. Samples for selection.
 - 4. Samples for verification.
 - B. Submit to Engineer for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.
 - C. Samples will be reviewed only for aesthetic, color, or finish selection.
 - D. Provide copies in accordance with GENERAL SUBMITTAL PROCEDURES and WEB-BASED ELECTRONIC SUBMITTAL PROCEDURES articles below.

3.07 SUBMITTALS FOR INFORMATION

- A. When the following are specified in individual sections, submit them for information and record purposes:
 - 1. Design data.
 - 2. Certificates.
 - 3. Test reports.
 - 4. Inspection reports.
 - 5. Manufacturer's instructions.
 - 6. Manufacturer's field reports.
 - 7. Other types indicated.

3.08 SUBMITTALS FOR PROJECT CLOSEOUT

- A. When the following are specified in individual sections, submit them at project closeout:
 - 1. Project record documents.
 - 2. Operation and maintenance data.
 - 3. Spare Parts Lists
 - 4. Warranties.
 - 5. Bonds.
 - 6. Other types as indicated.
- B. Submit to Engineer for Owner's benefit during and after project completion.

3.09 NUMBER OF COPIES OF SUBMITTALS

- A. Documents for Review:
 - 1. Small Size Sheets, Not Larger Than 11 x 17 inches (280 x 432mm): Submit one electronic copy, unless otherwise requested by the Engineer.
 - 2. Larger Sheets, Not Larger Than 36 x 48 inches: Submit one electronic copy, unless otherwise requested by the Engineer.
- B. Documents for Information: Submit one electronic copy, unless otherwise requested by the Engineer.
- C. Documents for Project Closeout: See Section 01 7800
- D. Samples: Submit the number specified in individual specification sections;
 - 1. Retained samples will not be returned to Contractor unless specifically so stated.

3.10 GENERAL SUBMITTAL PROCEDURES

- A. Transmit each submittal with the Contractor's standard project submittal cover page form that includes the information or identification noted below.

- B. Sequentially number the submittal form. Revise submittals with original number and a sequential alphabetic suffix.
- C. Identify Project, Contractor, Subcontractor, or supplier; pertinent drawing and detail number, and specification section number, as appropriate on each copy.
- D. Apply Contractor's stamp on each copy of each submittal, signed or initialed certifying that the product is in accordance with the requirements of the Work and Contract Documents. The stamp shall have the following wording: "I hereby certify that I have carefully examined the enclosed submittal(s) and have determined and verified all field measurements, construction criteria, materials, catalog numbers and similar data, coordinated the submittal(s) with other submissions and the work of other trades and contractors, and that to the best of my knowledge and belief, the enclosed submittal(s) is/are in full compliance with the Contract requirements, except as follows (enter NONE if there are no exceptions):"
- E. Shop drawing and product data submittals shall be transmitted to Engineer in electronic (PDF) format. When requested by the Engineer and/or for color samples, color charts, material samples, or related physical submittal requirements, deliver these to Engineer at ATTN: Construction Manager – Washington Academy Public Water System Consolidation, DuBois & King, Inc., PO Box 339, Randolph, Vermont 05060.
- F. Schedule submittals to expedite the Project, and coordinate submission of related items.
- G. For each submittal for review, allow 15 days excluding delivery time to and from the Contractor.
- H. Identify variations from Contract Documents and Product or system limitations that may be detrimental to successful performance of the completed Work.
- I. Provide space for Engineer's review stamp.
- J. Submit copies that are clear and legible. Copies will be returned unreviewed if this requirement is not met.
- K. When revised for resubmission, identify all changes made since previous submission.
- L. Distribute reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements.
- M. Submittals not requested will not be recognized or processed.
- N. Engineer will review and comment on each submission. Engineer's review will be only for conformance with the design concept of the Project and will be confined to general arrangement and compliance with the Contract Documents only, and will not be for the purpose of checking dimensions, weights, clearances, fitting, tolerances, interferences, or coordination of trades or contractors. The acceptance of a separate item does not represent acceptance of an assembly in which the item functions. Engineer's review and comments will in no way relieve Contractor of any of his responsibilities under the Contract.
- O. Engineer will mark Submittals as follows:

1. Accepted - Submittal appears to conform to Contract Documents and Contractor may proceed with ordering and installation.
 2. Accepted As Noted - Same as "Accepted," except it is accepted on the basis that the modifications or notes added to the submittal by Engineer will be complied with by Contractor.
 3. Revise and Resubmit - Submission shall be revised and resubmitted by Contractor.
 4. Rejected-Unacceptable - Submission is unacceptable as it does not appear to conform to the Contract Documents. A completely new submission of other equipment or different materials is required.
- P. No payment will be made on any item for which a submission is required if such submission:
1. has not been made,
 2. has been made but was not stamped "Accepted" by Engineer,
 3. has been made and stamped "Accepted As Noted," but Contractor has not complied with Engineer's notes marked on the submittal,
 4. has been made and stamped "Accepted," but item provided does not conform to the shop drawing nor to the Contract Documents.
- Q. Engineer's acceptance of submittals shall not relieve Contractor of responsibility for any deviation from the requirements of the Contract Documents unless Contractor has informed Engineer, in writing, of such deviation at the time of submission and Engineer has given written acceptance to the specific deviation, nor shall Engineer's acceptance relieve Contractor from responsibility for errors or omissions in the submittals.
- R. No portion of the Work requiring a submission shall be commenced until the submission has been accepted by Engineer.

3.11

END OF SECTION

SECTION 01 3250
CONSTRUCTION PROGRESS SCHEDULE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Preliminary schedule.
- B. Construction progress schedule, with network analysis diagrams and reports.

1.02 RELATED SECTIONS

- A. Section 01 3000 - Administrative Requirements.

1.03 SUBMITTALS

- A. Within 10 days after date of Agreement, submit preliminary schedule defining planned operations for the first 30 days of Work, with a general outline for remainder of Work.
- B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.
- C. Submit updated schedule with each Application for Payment.
- D. Submit under transmittal letter form specified in Section 01 3000.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRELIMINARY SCHEDULE

- A. Prepare preliminary schedule in the form of a preliminary network diagram. Schedule shall be coordinated with Washington Academy's schedule of Operation.

3.02 CONTENT

- A. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction.
- B. Identify work of separate stages and other logically grouped activities.
- C. Provide legend for symbols and abbreviations used.

3.03 NETWORK ANALYSIS

- A. Prepare network analysis diagrams and supporting mathematical analyses using the Critical Path Method.
- B. Illustrate order and interdependence of activities and sequence of work, how start of a given activity depends on completion of preceding activities, and how completion of the activity may restrain start of subsequent activities.
- C. Mathematical Analysis: Tabulate each activity of detailed network diagrams, using

calendar dates, and identify for each activity:

1. Preceding and following event numbers.
2. Activity description.
3. Estimated duration of activity, in maximum 15 day intervals.
4. Earliest start date.
5. Earliest finish date.
6. Actual start date.
7. Actual finish date.
8. Latest start date.
9. Latest finish date.
10. Total and free float; float time shall accrue to Owner and to Owner's benefit.

3.04 UPDATING SCHEDULE

- A. Maintain schedules to record actual start and finish dates of completed activities.
- B. Indicate progress of each activity to date of revision, with projected completion date of each activity.
- C. Identify activities modified since previous submittal, major changes in Work, and other identifiable changes.

3.05 DISTRIBUTION OF SCHEDULE

- A. Distribute copies of updated schedules to Contractor's project site file, to Subcontractors, suppliers, Engineer, Owner, and other concerned parties.
- B. Instruct recipients to promptly report, in writing, problems anticipated by projections shown in schedules.

END OF SECTION

SECTION 01 4000
QUALITY REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Quality assurance submittals.
- B. Mock-ups.
- C. Control of installation.
- D. Tolerances.
- E. Inspection services.
- F. Manufacturers' field services.

1.02 RELATED REQUIREMENTS

- A. Section 01 3000 - Administrative Requirements: Submittal procedures.
- B. Section 01 4250 - Reference Standards.
- C. Section 01 6000 - Product Requirements: Requirements for material and product quality.

1.03 REFERENCE STANDARDS

- A. ASTM C 1021 - Standard Practice for Laboratories Engaged in Testing of Building Sealants; 2008.
- B. ASTM C 1077 - Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation; 2009.
- C. ASTM C 1093 - Standard Practice for Accreditation of Testing Agencies for Masonry; 2009.
- D. ASTM D 3740 - Standard Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction; 2008.
- E. ASTM E 329 - Standard Specification for Agencies Engaged Construction Inspection and/or Testing; 2009.
- F. ASTM E 543 - Standard Specification for Agencies Performing Nondestructive Testing; 2009.
- G. ASTM E 548 - Standard Guide for General Criteria used for Evaluating Laboratory Competence; 1994.

1.04 SUBMITTALS

- A. Testing Agency Qualifications:
 - 1. Prior to start of Work, submit agency name, address, and telephone number,

and names of full time personnel with their listed certifications and responsible officer.

- B. Test Reports: After each test/inspection, promptly submit two copies of report to Engineer.
1. Include:
 - a. Date issued.
 - b. Project title and number.
 - c. Name of inspector.
 - d. Date and time of sampling or inspection.
 - e. Identification of product and specifications section.
 - f. Location in the Project.
 - g. Type of test/inspection.
 - h. Date of test/inspection.
 - i. Results of test/inspection.
 - j. Conformance with Contract Documents.
 - k. When requested by Engineer, provide interpretation of results.
 2. Test reports are submitted for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.
- C. Certificates: When specified in individual specification sections, submit certification by the manufacturer and/or installation/application subcontractor to Engineer.
1. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
 2. Certificates may be recent or previous test results on material or product, but must be acceptable to Engineer.
- D. Manufacturer's Instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, to the Engineer. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.
- E. Manufacturer's Field Reports: Submit reports for Engineer's benefit as contract administrator or for Owner.
1. Submit report in duplicate within 10 days of observation to Engineer.
 2. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.

- F. Erection Drawings: Submit drawings for Engineer's benefit as contract administrator or for Owner.
 - 1. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.
 - 2. Data indicating inappropriate or unacceptable Work may be subject to action by Engineer or Owner.

1.05 REFERENCES AND STANDARDS - See Section 01 4250.

1.06 TESTING AND INSPECTION AGENCIES

- A. Contractor shall employ and pay for services of an independent testing agency to perform specified testing.
- B. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.
- C. Contractor Employed Agency:
 - 1. Testing agency: Comply with requirements of ASTM E 329, ASTM E 543, ASTM C 1021, ASTM C 1077, ASTM C 1093, and ASTM D 3740.
 - 2. Laboratory: Authorized to operate in State in which Project is located.
 - 3. Laboratory Staff: Maintain a full time registered Engineer on staff to review services.
 - 4. Testing Equipment: Calibrated at reasonable intervals either by NIST or using an NIST established Measurement Assurance Program, under a laboratory measurement quality assurance program.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.
- B. Comply with manufacturers' instructions, including each step in sequence.
- C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Engineer before proceeding.
- D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Have Work performed by persons qualified to produce required and specified quality.
- F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

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

3.02 TOLERANCES

- A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.
- B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Engineer before proceeding.
- C. Adjust products to appropriate dimensions; position before securing products in place.

3.03 TESTING

- A. See individual specification sections for testing required.
- B. Testing Agency Duties:
 - 1. Test samples of mixes submitted by Contractor.
 - 2. Provide qualified personnel at site. Cooperate with Engineer and Contractor in performance of services.
 - 3. Perform specified sampling and testing of products in accordance with specified standards.
 - 4. Ascertain compliance of materials and mixes with requirements of Contract Documents.
 - 5. Promptly notify Engineer and Contractor of observed irregularities or non-conformance of Work or products.
 - 6. Perform additional tests required by Engineer.
 - 7. Submit reports of all tests performed.
- C. Limits on Testing Agency Authority:
 - 1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
 - 2. Agency may not approve or accept any portion of the Work.
 - 3. Agency may not assume any duties of Contractor.
 - 4. Agency has no authority to stop the Work.
- D. Contractor Responsibilities:
 - 1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
 - 2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
 - 3. Provide incidental labor and facilities:

- a. To provide access to Work to be tested.
 - b. To obtain and handle samples at the site or at source of Products to be tested.
 - c. To facilitate tests.
 - d. To provide storage and curing of test samples.
- 4. Notify Engineer and laboratory 24 hours prior to expected time for operations requiring testing services.
 - 5. Employ services of an independent qualified testing laboratory and pay for additional samples and tests, required by Contractor beyond specified requirements.
- E. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by Engineer.
 - F. Re-testing required because of non-conformance to specified requirements shall be paid for by Contractor.
 - G. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by Engineer. Payment for re testing shall be paid by the Contractor.

3.04 MANUFACTURERS' FIELD SERVICES

- A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment as applicable, and to instruct Owner in proper operation and Maintenance procedures and requirements.
- B. Submit qualifications of observer to Engineer 15 days in advance of required observations.
 - 1. Observer subject to approval of Engineer.
- C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.
- D. Submit a "Certificate of Compliance" attached hereto, or reasonable facsimile.

3.05 DEFECT ASSESSMENT

- A. Replace Work or portions of the Work not conforming to specified requirements.
- B. If, in the opinion of Engineer, it is not practical to remove and replace the Work, Contractor shall propose an appropriate remedy for review and acceptance by Engineer, or if acceptable to Owner, accept an adjustment in payment.

END OF SECTION

SECTION 01 4250
REFERENCE STANDARDS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Requirements relating to referenced standards.
- B. Reference standards full title and edition date.

1.02 RELATED SECTIONS

- A. Document 00700 - General Conditions: Reference standards.

1.03 QUALITY ASSURANCE

- A. For products or workmanship specified by reference to a document or documents not included in the Contract Document, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Conform to reference standard of date of issue current on date for receiving bids or specified in the individual specification, except where a specific date is established by applicable code.
- C. Obtain copies of standards when required by the Contract Documents.
- D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.
- E. Should specified reference standards conflict with Contract Documents, request clarification from the Engineer before proceeding.
- F. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of the Engineer shall be altered by the Contract Documents by mention or inference otherwise in any reference document.

PART 2 - CONSTRUCTION INDUSTRY ORGANIZATION DOCUMENTS

2.01 The following is a partial list of abbreviations which may be used in the Specifications, and the organizations to which they refer:

AA -- ALUMINUM ASSOCIATION, INC.

AAN -- AMERICAN ASSOCIATION OF NURSERYMEN

AASHTO -- AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS

ACI -- AMERICAN CONCRETE INSTITUTE

AGA -- AMERICAN GAS ASSOCIATION

AIA -- AMERICAN INSTITUTE OF ARCHITECTS
AISC -- AMERICAN INSTITUTE OF STEEL CONSTRUCTION, INC.
AISI -- AMERICAN IRON AND STEEL INSTITUTE
AMCA -- AIR MOVEMENT AND CONTROL ASSOCIATION INTERNATIONAL, INC.
ANSI -- AMERICAN NATIONAL STANDARDS INSTITUTE
AREA -- AMERICAN RAILWAY ENGINEERING ASSOCIATION
ARI -- AIR-CONDITIONING AND REFRIGERATION INSTITUTE
ASA -- ACOUSTICAL SOCIETY OF AMERICA
ASHRAE -- AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS, INC.
ASME -- THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS
ASTM -- AMERICAN SOCIETY FOR TESTING AND MATERIALS
AWPA -- AMERICAN WOOD-PRESERVERS' ASSOCIATION
AWS -- AMERICAN WELDING SOCIETY
AWWA -- AMERICAN WATER WORKS ASSOCIATION
CBM -- CERTIFIED BALLAST MANUFACTURERS
DHUD -- U.S. DEPARTMENT OF HOUSING & URBAN DEVELOPMENT
EIA -- ELECTRONIC INDUSTRIES ASSOCIATION
EPA -- U.S. ENVIRONMENTAL PROTECTION AGENCY (USEPA)
ETL -- ETL TESTING LABORATORY
FM -- FACTORY MUTUAL RESEARCH CORPORATION
FmHA -- FARMERS HOME ADMINISTRATION, U.S. DEPARTMENT OF AGRICULTURE
FS -- FEDERAL SPECIFICATION
IBR -- INSTITUTE OF BOILER AND RADIATOR MANUFACTURERS
IEEE -- INSTITUTE OF ELECTRICAL AND ELECTRONIC ENGINEERS
IPCEA -- INSULATED POWER CABLE ENGINEERS ASSOCIATION
NBFU -- NATIONAL BOARD OF FIRE UNDERWRITERS
NBS -- NATIONAL BUREAU OF STANDARDS
NECA -- NATIONAL ELECTRICAL CONTRACTORS ASSOCIATION

NEMA -- NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
NEWWA -- NEW ENGLAND WATER WORKS ASSOCIATION
NFPA -- NATIONAL FIRE PROTECTION ASSOCIATION
NSF -- NSF INTERNATIONAL (National Sanitation Foundation)
OSHA -- U.S. OCCUPATIONAL SAFETY & HEALTH ADMINISTRATION
PCA -- PORTLAND CEMENT ASSOCIATION
PCI -- PRECAST/PRESTRESSED CONCRETE INSTITUTE
PS -- PRODUCT STANDARD
SCS -- U.S. SOIL CONSERVATION SERVICE
SDI -- STEEL DOOR INSTITUTE
SJI -- STEEL JOIST INSTITUTE
UBC -- UNIFORM BUILDING CODE
UL -- UNDERWRITERS LABORATORIES, INC.
WWPA -- WESTERN WOOD PRODUCTS ASSOCIATION
END OF SECTION

SECTION 01 4500
ABBREVIATIONS AND SYMBOLS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Common abbreviations and symbols and their meanings which are used throughout the Contract Documents.

1.02 RELATED SECTIONS

- A. Section 01 4250 - Reference Standards.

1.03 OTHER REFERENCES

- A. Other abbreviations and symbols may be found in legends and elsewhere on the Drawings. Piping material abbreviations are contained in the piping Sections.
- B. Should an abbreviation or symbol not be specifically defined, it shall carry the standard definition commonly used in the industry.
- C. Whenever any doubt arises as to what an abbreviation or symbol means, notify Engineer and he will issue a definition in writing.

1.04 ABBREVIATIONS

- A. The following is a list of commonly used abbreviations which may be found in the Contract Documents, and the meanings ascribed to them:

A.C. or ac	Alternating Current
a or A	Amperes
AFF	Above Finished Floor
amp or AMP	Amperes
Alum.	Aluminum
Asph.	Asphalt
Aux.	Auxiliary
AWG	American or Brown and Sharp Wire Gauge
Bit. Conc.	Bituminous Concrete
Btu	British Thermal Unit
CB	Circuit Breaker
Cl.	Class

cm	Centimeter
C.O.	Cleanout
Conc.	Concrete
Cont.	Continuous
Cu.	Cubic
cc	Cubic Centimeters
C.F.	Cubic Feet
CFM or cfm	Cubic Feet Per Minute
CFS or cfs	Cubic Feet Per Second
C.Y.	Cubic Yards
CT	Current Transformer
D.C. or dc	Direct Current
Dia.	Diameter
DWG. or Dwg.	Drawing
Dr.	Drive
Ea. or ea.	Each
EF	Each Face
EW	Each Way
Eff. or eff.	Efficiency
El. or Elev.	Elevation
Fin. Gr.	Finished Grade
fps	Feet Per Second
Ft. or ft.	Feet
ftg.	Footing
g.	Grams
Ga. or ga.	Gauge
Gal. or gal.	Gallon
Galv.	Galvanized
GPD or gpd	Gallons Per Day

GPM or gpm	Gallons Per Minute
H-O-A	Hand-off-automatic
Hz. or hz.	Hertz
I.D.	Inside Diameter
Inv.	Invert
IP	Instrument Panel
KVA or kva	Kilovolts-amperes
Kw or kw	Kilowatts
Kwh or KWH	Kilowatt-hours
Lbs. or lbs.	Pounds
L.F.	Linear Feet
LPA	Lighting Panel "A"
L.S.	Lump Sum
m.	Meters
mA.	Milliamperes
Max. or max.	Maximum
MCC	Motor Control Center
Mfbm	Thousand Foot-Board Measure
mg.	Milligrams
MGD or mgd	Million Gallons Per Day
mi.	Miles
Min. or min.	Minimum
mm	Millimeters
No. or no.	Number
nom.	Nominal
NPT	National Pipe Thread
N.T.S.	Not to Scale
O.D.	Outside Diameter
OS&Y	Outside Screw and Yoke

Oz. or oz.	Ounce
pb	Pushbutton
PPD	Pounds Per Day
P/B	Pullbox
pri.	Primary
psf	Pounds Per Square Foot
psi	Pounds Per Square Inch
psia	Pounds Per Square Inch, Absolute
psig	Pounds Per Square Inch, Gauge
PT	Potential Transformer
Pvt. or Pvmt.	Pavement
R.	Radius
R.O.W.	Right-of-Way
scfm	Standard Cubic Feet per minute
Sch.	Schedule
sec.	Secondary or Seconds
Sq. or sq.	Square
S.F.	Square Feet
S/S/P	Stop-start-pilot Station
Std. or std.	Standard
S.Y.	Square Yards
T&B	Top and Bottom
Typ.	Typical
U.O.N.	Unless Otherwise Noted
V or v	Volts
Vac or VAC	Alternating Current Voltage
Vdc or VDC	Direct Current Voltage
V.F.	Vertical Feet
Vol.	Volume

W or w	Watts
w.c.	Water Column
WSP	Working Steam Pressure
Yd. or yd.	Yards

1.05 SYMBOLS

- A. The following is a list of commonly used symbols which may be found in the Contract Documents, and the meanings as scribed to them:

Phase, Diameter, or Round (as applicable)

° Degrees (F. = Fahrenheit C. = Centigrade)

' Feet or Minutes

" Inches or Seconds

Number or Pound

/ Per or Divided By

4:1 4 horizontal to 1 vertical, slope

1 on 4 1 vertical on 4 horizontal, slope

END OF SECTION

SECTION 01 5000
TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Temporary utilities.
- B. Temporary sanitary facilities.
- C. Temporary Controls: Barriers, enclosures, and fencing.
- D. Security requirements.
- E. Vehicular access and parking.
- F. Traffic Control
- G. Waste removal facilities and services.
- H. Project identification sign.
- I. Field offices.

1.02 RELATED REQUIREMENTS

- A. Section 01 5100 - Temporary Utilities.
- B. Section 01 5250 - Field Offices.

1.03 TEMPORARY UTILITIES - See Section 01 5100.

- A. Provide and pay for all electrical power, lighting, water, heating and cooling, and ventilation required for construction purposes.
- B. Existing facilities may not be used.

1.04 TEMPORARY SANITARY FACILITIES

- A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.
- B. Use of existing facilities is not permitted.
- C. Maintain daily in clean and sanitary condition.

1.05 BARRIERS

- A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public and to protect existing facilities and adjacent properties from damage from construction operations.
- B. Provide protection for equipment designated to remain. Replace damaged equipment.
- C. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.06 FENCING

- A. Construction: Contractor's option.
- 1.07 EXTERIOR ENCLOSURES
- A. Provide temporary weather tight closure of exterior openings to accommodate acceptable working conditions and protection for Products, to allow for temporary heating and maintenance of required ambient temperatures identified in individual specification sections, and to prevent entry of unauthorized persons. Provide access doors with self-closing hardware and locks.
- 1.08 INTERIOR ENCLOSURES
- A. Provide temporary partitions as indicated to separate work areas from occupied areas, to prevent penetration of dust and moisture into occupied areas, and to prevent damage to existing materials and equipment.
- 1.09 SECURITY
- A. Provide security and facilities to protect Work, existing facilities, and Owner's operations from unauthorized entry, vandalism, or theft.
 - B. Coordinate with Owner's security program.
- 1.10 VEHICULAR ACCESS AND PARKING
- A. Coordinate access and haul routes with governing authorities and Owner.
 - B. Provide and maintain access to fire hydrants, free of obstructions.
 - C. Provide means of removing mud from vehicle wheels before entering streets.
 - D. Designated existing on-site roads may be used for construction traffic.
 - E. Provide temporary parking areas to accommodate construction personnel. When site space is not adequate, provide additional off-site parking.
- 1.11 TRAFFIC CONTROL
- A. Maintenance of Traffic
 1. Provide a minimum of one lane for two-way traffic on all public roads at all times.
 2. Provide and maintain strong, suitable and safe temporary crossings and detours over and around the Work as necessary to maintain access to public and private property and to maintain pedestrian and vehicular traffic.
 3. Fire hydrants, water holes, and other sources of water for fire protection, on or adjacent to the Project site, shall be kept accessible to fire apparatus, and no obstructions shall be placed within ten (10) feet of any such source.
 4. Notify police and fire departments in writing, with a copy to the Engineer, 24 hours in advance if the closure of a street is necessary, and cooperate with the Police Department in establishment of alternate routes.

- B. Uniformed Traffic Officers and Flaggers
 - 1. Furnish qualified, uniformed traffic officers and/or flaggers for the handling of traffic around and through the site of any work in accordance with the Contract. Uniformed Traffic Officers and Flaggers are also referred to as Traffic Control Personnel
 - 2. Uniformed Traffic Officers shall have police powers granted by statutory authority.
 - 3. Uniformed Traffic Officers and Flaggers shall have completed a training course given by a certified Traffic Control Personnel trainer. The Contractor shall certify to the Engineer the names of all trained Traffic Control Personnel on the project. The certification shall be updated as necessary.
 - 4. Uniformed Traffic Officers shall wear uniforms, head gear, and exposed police badges that will clearly identify them as a law enforcement officer and shall present a neat appearance commensurate with their assignment. They shall wear reflectorized vests.
 - 5. Flaggers shall wear approved head gear and reflectorized vests in conformance with Part 6F of the MUTCD standards.
- C. Warning Signs
 - 1. Provide warning signs, detour signs and other traffic control devices to insure the safety of the public and to adequately direct traffic around the Work.
- D. Lighting
 - 1. Illuminate barricades, obstructions, and warning and detour signs, from sunset to sunrise.

1.12 WASTE REMOVAL

- A. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.
- B. Provide containers with lids. Remove trash from site periodically.

1.13 PROJECT IDENTIFICATION

- A. Provide project identification sign of design and construction identified in the front end documents.
- B. Erect on site at location agreeable to the Owner.
- C. No other signs are allowed without Owner permission except those required by law.

1.14 FIELD OFFICES - See Section 01 5250.

- A. Provide one (1) Engineer Office and Contractor Office and Facilities as required.
- B. Field Offices: Weathertight, with lighting, electrical outlets, heating, cooling and

ventilating equipment, and equipped with sturdy furniture, drawing rack and drawing display table.

- C. Provide space for Project meetings, with table and chairs to accommodate 6 persons.
- D. Maintain access to all field offices at all times throughout the construction period.
- E. Refer to Section 01 5250 for further details and requirements.

1.15 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

- A. Remove temporary utilities, equipment, facilities, materials, prior to Final Application for Payment inspection.
- B. Clean and repair damage caused by installation or use of temporary work.
- C. Restore existing facilities used during construction to original condition.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 5100
TEMPORARY UTILITIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Temporary Utilities: Electricity, lighting, heat, ventilation, and water.

1.02 RELATED REQUIREMENTS

- A. Section 01 5000 - Temporary sanitary facilities required by law.

1.03 TEMPORARY ELECTRICITY

- A. Cost: By Contractor.
- B. Contractor shall coordinate with the local utility company to establish the power service characteristics that are available at the project site.
- C. Provide power outlets for construction operations, with branch wiring and distribution boxes located as required. Provide flexible power cords as required.
- D. Permanent convenience receptacles may not be utilized during construction.

1.04 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES

- A. Provide and maintain lighting for construction operations.
- B. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtails, and lamps as required.
- C. Permanent building lighting may not be utilized during construction.

1.05 TEMPORARY HEATING

- A. Cost of Energy: By Contractor.
- B. Provide heating devices and heat as needed to maintain specified conditions for construction operations.
- C. Existing facilities shall not be used.

1.06 TEMPORARY COOLING

- A. Cost of Energy: By Contractor.
- B. Provide cooling devices and cooling as needed to maintain specified conditions for construction operations.
- C. Existing facilities shall not be used.

1.07 TEMPORARY VENTILATION

- A. Existing ventilation equipment may not be used.

1.08 TEMPORARY WATER SERVICE

- A. Cost of Water Used: By Contractor.

B. Provide and maintain suitable quality water service for construction operations at time of project mobilization.

C. Connect to existing water source.

1. Exercise measures to conserve water.

2. Coordinate connection with Owner.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 5250

FIELD OFFICES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Temporary field offices for use of Engineer.
- B. Temporary field offices for use of Contractor.
- C. Maintenance and removal.

1.02 RELATED REQUIREMENTS

- A. Section 01 1000 - Summary.
- B. Section 01 5000 - Temporary Facilities and Controls

1.03 USE OF EXISTING FACILITIES

- A. Existing facilities shall not be used for field offices.

1.04 USE OF PERMANENT FACILITIES

- A. Permanent facilities shall not be used for field offices.

PART 2 PRODUCTS

2.01 MATERIALS, EQUIPMENT, FURNISHINGS

- A. Materials, Equipment, and Furnishings: Serviceable, new or used, adequate for required purpose.

2.02 CONSTRUCTION

- A. Portable or mobile buildings, or buildings constructed with floors raised above ground, securely fixed to foundations, with steps and landings at entrance doors.
- B. Construction: Structurally sound, secure, weather tight enclosures for office. Maintain during progress of Work; remove at completion of Work.
- C. Fire Extinguishers: Appropriate type fire extinguisher at each office.

2.03 ENVIRONMENTAL CONTROL

- A. Heating, Cooling, and Ventilating: Automatic equipment to maintain comfort conditions; 68 degrees F heating and 76 degrees F cooling.

2.04 CONTRACTOR'S OFFICE AND FACILITIES

- A. Size: For Contractor's needs and to provide space for project meetings.
- B. Furnishings in Meeting Area: Chairs to seat at least 6 persons; racks and files for Contract Documents, submittals, and project record documents.

- C. Other Furnishings: Contractor's option.
- D. Equipment: 4 adjustable band protective helmets for visitors.

2.05 ENGINEER OFFICE

- A. Separate space for sole use of Engineer, with separate entrance door with new lock and two keys.
- B. Area: Minimum 150 sq ft, minimum dimension 8 ft.
- C. Windows: Minimum three with operable sash and insect screens. Locate to provide views of construction area.
- D. Electrical Outlets: Minimum Three 110 volt duplex convenience outlets.
- E. Sanitary Facilities: As specified in Section 01 5000.
- F. Furnishings:
 - 1. One desk 54 x 30 inch, with three drawers.
 - 2. One drafting table 36 x 72 inch, with one equipment drawer.
 - 3. Plan rack to hold working Drawings, shop drawings, and record documents.
 - 4. One standard four-drawer letter size metal filing cabinet with locks and two keys per lock.
 - 5. Six linear ft of metal bookshelves.
 - 6. One swivel arm chair.
 - 7. Two straight chairs.
 - 8. One drafting table stool.
 - 9. One tackboard 36 x 30 inch.
 - 10. One waste basket per desk and table.
- G. Equipment:
 - 3. Two waste paper baskets.
 - 4. First aid kit.
 - 5. Outdoor thermometer.
 - 6. Broom and dustpan.
 - 7. One "all in one printer" that can copy, scan, create a pdf file, receive/transmit facsimile.
- H. Supplies:
 - 1. Light bulbs.

2. Soap, paper cups, and paper hand towels.
 3. Ribbons and paper for calculator.
 4. Replenish and recharge fire extinguisher and first aid kit.
 5. Paper and toner for copier.
- I. Trailer floor plan submittal is required for review/approval of the Engineer and Owner prior to bringing trailer onto the site.

PART 3 EXECUTION

3.01 PREPARATION

- A. Fill and grade sites for temporary structures to provide drainage away from buildings.

3.02 INSTALLATION

- A. Install office spaces ready for occupancy at time of Project Mobilization.

3.03 REMOVAL

- A. At completion of Work remove furnishings, equipment, supplies, buildings, foundations, utility services, and debris. Restore areas.

END OF SECTION

SECTION 01 5800
PROJECT IDENTIFICATION SIGNS

PART 1 - GENERAL

1.01 GENERAL

- A. Contractor shall, within fifteen days after the Notice to Proceed, provide, install at a designated area, and maintain the Project Signs described in the Special Conditions. Remove the signs from the construction site at the completion of construction, when approved by Engineer.

1.02 PROJECT SIGN INFORMATION

- A. Text information will be provided to the Contractor prior to the date of the Notice to Proceed.

1.03 ADVERTISING SIGNS

No commercial or advertising signs will be allowed on the site of the Work or on public property in the vicinity of the Work.

END OF SECTION

SECTION 01 6000
PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General product requirements.
- B. Re-use of existing products.
- C. Transportation, handling, storage and protection.
- D. Product option requirements.
- E. Substitution limitations and procedures.
- F. Procedures for Owner-supplied products.
- G. Maintenance materials, including extra materials, spare parts, tools, and software.

1.02 RELATED REQUIREMENTS

- A. Section 01 4000 - Quality Requirements

1.03 SUBMITTALS

- A. Proposed Products List: Submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
 - 1. Submit within 15 days after date of Notice to Proceed.
 - 2. For products specified only by reference standards, list applicable reference standards.
- B. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- C. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- D. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
 - 1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.
- E. Indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

PART 2 PRODUCTS

2.01 EXISTING PRODUCTS

- A. All products shall be new and unused. Do not use materials and equipment removed from existing premises unless specifically required or permitted by the Contract Documents.
- B. Existing materials and equipment indicated to be removed, but not to be re-used, relocated, reinstalled, delivered to the Owner, or otherwise indicated as to remain the property of the Owner, become the property of the Contractor; remove from site.

2.02 NEW PRODUCTS

- A. Provide new products unless specifically required or permitted by the Contract Documents.
- B. Provide interchangeable components of the same manufacture for components being replaced.

2.03 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.
- B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.
- C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

2.04 MAINTENANCE MATERIALS

- A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.
- B. Deliver to Owner at a location to be designated during construction.

PART 3 EXECUTION

3.01 SUBSTITUTION PROCEDURES

- A. Substitutions may be considered when a product becomes unavailable through no fault of the Contractor.
- B. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.
- C. A request for substitution constitutes a representation that the submitter:
 - 1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
 - 2. Will provide the same warranty for the substitution as for the specified product.
 - 3. Will coordinate installation and make changes to other Work that may be

required for the Work to be complete with no additional cost to Owner.

4. Waives claims for additional costs or time extension that may subsequently become apparent.
 5. Will reimburse Owner for review or redesign services associated with the substitution.
- D. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.
- E. Substitution Submittal Procedure:
1. Submit three copies of request for substitution for consideration. Limit each request to one proposed substitution.
 2. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence. Burden of proof is on proposer.
 3. The Engineer will notify Contractor in writing of decision to accept or reject request.

3.02 TRANSPORTATION AND HANDLING

- A. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.
- B. Transport and handle products in accordance with manufacturer's instructions.
- C. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.
- D. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
- E. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.
- F. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.03 STORAGE AND PROTECTION

- A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.
- B. Store and protect products in accordance with manufacturers' instructions.
- C. Store with seals and labels intact and legible.
- D. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.

- E. For exterior storage of fabricated products, place on sloped supports above ground.
- F. Provide off-site storage and protection when site does not permit on-site storage or protection.
- G. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- H. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
- I. Prevent contact with material that may cause corrosion, discoloration, or staining.
- J. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- K. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION

SECTION 01 6100

GENERAL MECHANICAL REQUIREMENTS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This Section covers the general requirements for all pumps and equipment specified in Divisions 26 and 33, and the testing of such equipment. Use this Section in conjunction with these Divisions to ascertain all mechanical requirements. However, the specific requirements of the individual Sections shall take precedence over the general requirements of this Section.
- B. Provide all labor, materials, equipment, appliances, tools and hardware and perform all work necessary to provide complete, operational systems as specified, shown on the Drawings, and work not specifically shown or specified, yet required to insure proper and complete operation of systems and to satisfy the design intent inherent in the Work and to comply with all applicable codes, laws, regulations and ordinances and the requirements of utility companies and authorities having jurisdiction.
- C. In addition to the requirements in this Section and Divisions 26 and 33, comply with the material and equipment requirements in Section 016000.
- D. Definition - "Pumping Unit" means a pump or blower, complete with, but not limited to, drive motor, connecting shafting, bearings, belts, chain, gears, gear units, couplings, accessories, safety guards on exposed moving parts, appurtenances, and associated equipment.

1.02 QUALITY ASSURANCE

- A. Design and fabricate equipment in conformance with ANSI, ASME, ASHRAE, IEEE, NEC, and NEMA Standards. Equipment shall be of rugged construction and of sufficient strength to withstand the stresses which may occur during fabrication, testing, transportation, installation, and conditions of operation. In addition, pumps shall conform to the requirements of the Hydraulic Institute. All equipment shall comply with the latest OSHA regulations and the ANSI Safety Standards.
- B. Equipment shall be products of manufacturers who produce evidence of their ability to promptly furnish any and all interchangeable replacement parts as may be needed at any time within the expected life of the equipment. Manufacturers shall also possess, or have readily available access to, suitable and accurate testing facilities for performing the required shop tests.
- C. The Drawings are intended to show the general arrangement of equipment, structural supports, foundations, connected piping, and valves. It is anticipated that supports, foundations, piping, valves and other associated and appurtenant items may, in part or in whole, have to be changed in order to accommodate the actual equipment furnished. Make these modifications, as required.

- D. For pumping units, the direction of rotation shall be as shown or indicated on the Drawings. Suction and discharge nozzle and pipe sizes, specified or indicated by the connecting piping, shall not be changed without Engineer's written acceptance.

1.03 SUBMITTALS

- A. See Section 013000.
- B. When requested by Engineer, any information which may be deemed necessary to determine the ability of a proposed manufacturer to produce specified equipment.
- C. Statement on the scheme of control sequence and timing of operations for switches covered under Part 2.
- D. List of each piece of equipment and each valve provided. Use Equipment Record sheet contained in Section 013000, or the other applicable forms contained in the Specifications.
- E. Letters from each manufacturer listing the spare parts, greases, special tools, and appliances which are required and will be provided (See Paragraphs 2.03.B, 2.03.C, and 2.04).
- F. Certification by manufacturer or nationally recognized testing agency that pumping units have been tested and that they conform to the requirements of the Specifications and the Hydraulic Institute, including method of test. Include copies of certified or characteristic test reports and performance curves as required.
- G. Report by manufacturer's representative of the results of his inspection, operation, adjustments and tests, and if equipment is ready for permanent operation.

PART 2 - PRODUCTS

2.01 EQUIPMENT - GENERAL

- A. Service - Unless otherwise specified, equipment shall be designed and fabricated for 24-hour, continuous service at any and all points within the normal and specified range of operation, without overheating, without cavitation, without excessive vibration, strain or noise, and requiring only that degree of maintenance generally accepted as peculiar to the specific equipment.
- B. Interchangeable Parts - All parts and components of equipment shall be designed and fabricated for interchangeability so that replacement parts may be installed without the need for special fittings or machining.
- C. Electric Motors - Unless otherwise specified, the equipment manufacturer shall provide the motor, driving mechanisms, and other components as a completely assembled and connected unit to insure complete compatibility. Except where otherwise specified, motor starters, operating controls, wiring, and other electrical work shall be provided as specified in the appropriate sections of Division 26.

- D. Electrical Requirements - Equipment comprising several electrically operated devices shall be furnished completely wired with electrical appliances, conduits, and connections which are integral parts thereof. Connections shall terminate in galvanized cast iron junction boxes of ample size, or equivalent provisions for threaded conduit. See Division 26 for more detailed requirements and for special construction requirements.
- E. Switches - Enclose limit and other mechanically actuated switches in cast metal boxes and install in the proper locations, ready for conduit connections. Switches shall be complete with supports, stops, cams, arms, and tripping and operating members which shall be adjustable where required for proper functioning. Submit complete statement of the scheme of control sequence and timing of operations required. The electrical parts of mechanically actuated switches shall be encased, as specified, and be fully protected from shock and strain under all operating conditions. The manufacturer shall guarantee, for the service required, the electrical units and parts used in the assembly.
- F. Pipe Connections (Unless Otherwise Specified)
 - 1. Flanged - ANSI, Class 125
 - 2. Screwed - ANSI B2.1, Standard taper pipe threads
- G. Moving Surfaces - Adequately protect bearings and moving parts against wear by bushings or other protective means which shall be fully lubricated by readily accessible devices. Grease lubricating fittings on equipment shall be extensions terminating with alemite fittings.
- H. Templates and Working Drawings - Furnish suitable templates and working drawings to insure accuracy of installation.
- I. Anchoring - Provide and protect necessary guides, track rails, bearing plates, anchor and attachment bolts, stays, braces, and other appurtenances needed for the installation. Anchor bolts and nuts shall be of ample size and strength for the purpose intended and, except where otherwise noted, shall be of galvanized or stainless steel. Anchors shall be furnished by the equipment manufacturer. Set anchors in accordance with the manufacturers' recommended installation instructions. Bolts or studs engaging tapped holes in equipment compartments shall be silicon bronze. Expansion bolts are not permitted to be used on equipment which is subject to vibrations or movement.
- J. New Equipment At Existing Facilities - Whenever new equipment is required, for which an existing similar item of equipment already exists, it is Owner's desire to be provided with identical units by the same manufacturer in order to minimize his inventories and to maintain service with current service centers. Further, where new equipment is being used to modify or to become a part of existing equipment, Owner desires parts and accessories from the manufacturer of the existing equipment. In this respect, Contractor is required to give preference to providing products of existing equipment

manufacturers. EXCEPTIONS TO THIS ARE WHEN OTHER PRODUCTS ARE SPECIFICALLY SPECIFIED, IN WHICH CASE OWNER DESIRES NOT TO UTILIZE PRODUCTS OF THE EXISTING EQUIPMENT MANUFACTURERS.

- K. Equipment Drive Guards - All equipment driven by open shafts, belts, chains, or gears shall be provided with approved all metal guards enclosing the drive mechanism.

2.02 PUMP CHARACTERISTIC CURVES

- A. For each pump specified, except plunger and positive displacement types, first submit for approval (or simultaneously with other required drawings) characteristic curves of the proposed pump, plotted on at least 8½" by 11" graph paper. For each pump, show the following characteristic curves as ordinates plotted against the rate of flow as abscissa for the complete range of flow of the pump:
 - 1. Total Dynamic Head
 - 2. Pump Efficiency
 - 3. Brake Horsepower
- B. Definitions of terms and rating standards shall be in accordance with the requirements of the Hydraulic Institute.
- C. The limits of the range of rate of flow at which the pump can successfully operate shall be indicated on each curve when the operable range differs from the complete range shown. If the pump is for multi-speed service, provide characteristic curves for each speed specified.

2.03 TOOLS

- A. Grease Guns - Where grease lubrication is required, provide one grease gun for each different type of valve and one grease gun for each piece of equipment, except that only one grease gun need be supplied for identical equipment. In addition, provide additional grease guns when equipment or valves have more than one type or size of grease fitting and where more than one type of grease is recommended for use by the manufacturer.
- B. Grease - Secure from manufacturer and submit a list of recommended greases for each piece of equipment and each valve. For each piece of equipment and for each valve requiring grease lubrication, provide one grease gun cartridge of each type of grease required or sufficient quantity for one year of operation after Substantial Completion.
- C. Special Tools - Furnish with each type of equipment, one complete set of suitably marked special tools and appliances which may be needed to adjust, operate, maintain or repair the equipment. Submit a complete list of the special tools and appliances to be furnished. Furnish the tools and appliances in painted steel wall cases properly labeled and equipped with good grade cylinder locks and duplicate keys.

2.04 SPARE PARTS

- A. Furnish all spare parts specified and those which may be necessary to properly operate all systems for a period of one year after commencement of full time operation.

2.05 FABRICATION

- A. Welding - Structural fusion welding and gas cutting shall conform to the requirements of Division 5 and with the American Welding Society Code. Exposed welds shall be ground smooth and the corners of structural shapes shall be mitred.
- B. Appearance - Details shall be designed for appearance as well as for utility. Protruding members, joints, corners, gear covers and the like shall be finished in appearance.
- C. Finishing - Except as otherwise specified or required, prime and paint equipment at the factory in accordance with the manufacturer's recommendations. Necessary field painting shall comply with the requirements of Section 09 9100. Touch up scratched and abraded surfaces. Where the touch up is easily noticeable, the entire piece of equipment shall be repainted.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Neatly erect equipment and accurately set on prepared foundations.
- B. Align, level, plumb, and adjust equipment for proper operation and to insure that the necessary piping and electrical connections can be made.

3.02 FOUNDATIONS

- A. Concrete foundations for equipment shall be of approved design and adequate in size, suitable for the equipment, properly reinforced, and tied into floor slabs by means of reinforcing bars or dowels.
- B. Position and set foundation bolts by means of suitable templates. Firmly secure them to avoid displacement during the placement of concrete.
- C. Each piece of equipment or supporting base, bearing on concrete foundations, shall be bedded in grout conforming to the requirements specified in drawings. Grout shall completely fill the space between the equipment or base and the foundation, and it shall generally average 1" in thickness. Do not remove levelling wedges until the grout has reached final set. Voids left by wedges shall be pointed. Trowel and rub exposed grout surface to a neat finish.

3.03 FIELD QUALITY CONTROL

- A. As soon as conditions permit, run field tests on equipment and appliances. Provide the labor, materials, instruments and other items needed to accurately perform the required testing.

- B. Tests must be witnessed by Engineer. Perform tests to verify that equipment has been properly installed, meets operating conditions, runs at the proper speed, and is free from defects such as overheating, overloading, and undue noise and vibration.
- C. Procedures for conducting and reporting tests on pumps shall be in accordance with the Test Code of the Hydraulic Institute.
- D. Run each pump at maximum rated speed for at least three rates of flow corresponding to minimum rate, rated rate and maximum rate of flow specified, as evidenced by the corresponding total dynamic head shown on the pump gauges. Take simultaneous ammeter readings. Vary the rate of flow by throttling the discharge valve. The rated motor nameplate current and power shall not be exceeded at any rate of flow within the specified range. Take vibrometer and sound readings, when directed by Engineer, and record the results.

3.04 MANUFACTURER'S FIELD SERVICES

- A. Include in the Contract Price the cost of furnishing a competent, experienced, and qualified engineer or authorized representative of each manufacturer supplying mechanical and electrical equipment. Such representatives shall be available at the Project site within 48 hours of a verbal request by Contractor or Engineer.
- B. The purpose of the manufacturer's representative is to assist Contractor, when required, in installations, adjustments, testing, inspections, and start-up. He shall also instruct Engineer, when required, in inspection procedures and shall assist in, or perform, all testing to verify that equipment and materials have been installed properly, are operating as required and are in full compliance with the Specifications.
- C. Additional services required of the manufacturers, such as instructing the Owner in proper operating and maintenance procedures, are specified under other Sections.

END OF SECTION

SECTION 01 6660
PIPE AND MANHOLE LEAKAGE TESTING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. This Section covers the requirements for performing leakage tests on pipelines and appurtenances, and is one of the several bases for acceptance of the Work.
- B. All pressure pipes and appurtenances shall be tested for leakage.

1.02 QUALITY ASSURANCE

- A. Prior to final acceptance of the Work, all pressure pipes and appurtenances shall meet specific leakage requirements. These leakage requirements must be satisfied by the basic materials alone. Where joint fillers and the like have been specified, primarily to protect jointing materials, and secondarily to provide a factor of safety, they shall not be applied until after leakage tests have been completed and have been accepted by Engineer.
- B. Every test must be witnessed by Engineer and any test not so witnessed will be considered as not having been performed. Contractor shall pretest the Work and shall not request Engineer to witness the final test until he is reasonably certain that the test will yield results within the acceptable limits.

1.03 SUBMITTALS

- A. See Section 01 3000.
- B. Complete details and specifications on testing apparatus.
- C. Certified test results on forms approved by Engineer.

1.04 SEQUENCING AND SCHEDULING

- A. Notify Engineer at least 48 hours in advance of a scheduled test so that the test may be witnessed.

PART 2 MATERIALS

2.01 TESTING APPARATUS

- A. Provide all labor, pumps, plugs, measuring equipment and other apparatus, complete, and as required to perform all testing.
- B. Provide clean water, air, nitrogen and other materials as required to accomplish all testing.
- C. Provide plugs and caps capable of withstanding the test pressures.
- D. Provide all temporary flanges, plugs, bulkheads, thrust blocks, weighting, bracing and other items necessary to prevent joints from separating, and to prevent any injuries or damage.
- E. Monitoring air pressure gauge shall have a range of 0-10 psi, divisions of 0.10 psi, and

accuracy of 0.05 psi+.

PART 3 EXECUTION

3.01 PREPARATION

- A. Bracing Pressure Piping - Plug open ends, adequately block bends, tees, ends, and other fittings, and do whatever is necessary to brace the piping system so that it will safely withstand the pressures developed under the tests and so that no damage or injury will occur to the pipeline, people or property.
- B. Protection - Before tests are conducted, isolate or remove any regulator, gauge, trap, or other apparatus or equipment which may be damaged by test pressures.
- C. Flushing - Flush all piping systems, except air piping, with water prior to testing.

3.02 GENERAL

- A. Trapped Air - Trapped air may cause a false indication of the rate of leakage during exfiltration testing. Points of concern include ends of lines, stubs, house connections and high points in pipe lines. No credit will be made for this condition and no adjustment will be made to the allowable leakage. Where trapped air is suspected of causing a test failure, do whatever is necessary to evacuate the air and repeat the tests until the actual leakage is equal to or less than the allowable rate of leakage.
- B. Water Absorption - No credit will be given for absorption of water in pipe walls. If necessary, fill pipes and manholes with water well in advance of exfiltration testing and allow them to soak in order to eliminate or minimize the effects of absorption.

3.03 TESTS FOR PRESSURE PIPES

- A. General
 - 1. Leakage testing shall include the main pressure pipe, service connections, and all other appurtenances on the section of pipeline being tested.
 - 2. All pipes shall be tested prior to applying insulation and before they are concealed or furred-in.
 - 3. Provide all necessary gauges. Gauges shall be standard pressure type with a minimum 6" diameter dial and a pressure range not in excess of 150% of the maximum required test pressure.
 - 4. Provide and maintain at the site a gauge stand with an approved laboratory calibrated test gauge. Periodically check test gauges used for testing against the test gauge, and whenever requested by Engineer.
 - 5. Where it is absolutely necessary for testing, tap pipes and insert approved plugs after testing is completed. Install air release valves at high points for water testing if hydrants or blowoffs are not available.
 - 6. Provide a hand or motor driven pump to maintain the required test pressure constant throughout the duration of the test. If a water pump is used, install water meter on supply side of pump. If an air or inert gas pump is used,

leakage shall be determined and calculated by the cycling of the pump.

7. All concrete thrust blocks and restraints shall be in place and cured at least 7 days.
8. All buried pipe shall be backfilled.
9. All water main testing shall be in accordance with the requirements of AWWA Standard C600.

B. Nongaseous Pipe Hydrostatic Test

1. Open all air release valves and fill pipe with water at a rate not to exceed venting capacity of the valves.
2. Raise pressure to 150 percent of the highest working pressure, or 100 psig, whichever is greater, adjusted to lowest point of the test section. Maintain a minimum of 125 percent of the working pressure at the highest point of the test section. In some instances the lengths of test sections will have to be shortened to meet the above requirements.
3. Maintain pressure for a minimum of two (2) hours.
4. Perform leakage test.

C. Nongaseous Pipe Leakage Test

1. Perform simultaneously with hydrostatic test.
2. Maintain pressure within a maximum variation of ± 5 psi for 2 hours minimum.
3. Record amount of leakage from water meter.
4. Allowable leakage is:
 - a. Exposed piping: Exposed piping with flanged, threaded or welded joints, or buried pipe in conflict with potable water lines: No leakage allowed.
 - b. Other pipe by the formula:

$$L = \frac{[(S)(D)(\sqrt{P})]}{133,200}$$

L = Maximum allowable leakage in gallons per hour.

S = Length of pipe tested, in feet.

D = Nominal internal diameter of the pipe in inches

P = Average test pressure in pounds per square inch gage.

D. Gas and Air Pipe Test

1. Install tapped plug at air inlet and airtight plugs at other ends of the test section.
2. Connect air supply equipment to tapped plug and fill slowly until test pressure is attained. For chlorine gas lines, test with nitrogen. Nitrogen may be used in lieu of air.
3. Allow ample time for the temperature of the gas and piping to stabilize.
4. Set pressure to 150 percent of designed operating pressure and maintain a minimum of one hour. Examine all joints for leaks using a concentrated liquid soap or a commercial leak detection preparation.
5. Allowable leakage is:
 - a. Chlorine Gas Lines - No leakage
 - b. Air Lines - 5 percent of starting test pressure.
 - c. Other lines - As specified elsewhere or directed by the Engineer.

3.04 ALLOWABLE LEAKAGE

- A. It is the intent of this Contract to secure piping systems with leakage, in each section of pipe and within each structure, equal to, or less than that specified. It is also the intent to secure a piping system free from visible drips, streams, and leaks. Therefore, even if a portion of the system meets the requirements for allowable leakage, visible leaks are not permitted and shall be stopped.
- B. Leakage tests will be considered satisfactorily passed when the rate of leakage is equal to or less than the stipulated allowances, there is no evidence of visible leaks, and there is no evidence of other system defects.

3.05 RETESTING

- A. Pipes and manholes not passing the tests shall have all defects corrected to the satisfaction of Engineer, and shall be retested and recorrected as often as is necessary until the test requirements have been met.
- B. It is the intent of this Contract to obtain work meeting test requirements on their own and solely through the use of the normal integral sealing components. Joint leaks shall not be stopped through the use of concrete, caulking, mortar, or other patching materials. Leaking pipe joints shall be rejoined and leaking manhole joints shall have joints reset, or replaced if necessary.
- C. Methods other than rejoining, resetting or replacing joint seals shall require the written approval of Engineer.

END OF SECTION

SECTION 01 6670
STRUCTURE LEAKAGE TESTING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. This Section covers the requirements for performing leakage tests on structures, tanks, pump station wet wells, and appurtenances, and is one of the several basis for acceptance of the Work.
- B. Perform leakage tests on all tanks, structures, reservoirs, containers, channels, and appurtenances which will hold or convey a liquid.
- C. Water for testing shall be furnished by Contractor.

1.02 RELATED SECTIONS

- A. Section 016660 - Pipe and Manhole Leakage Testing

1.03 QUALITY ASSURANCE

- A. Prior to final acceptance of the Work, all structures, tanks and appurtenances shall meet specific leakage requirements. These leakage requirements must be satisfied by the basic materials alone. Where joint fillers and the like have been specified, primarily to protect jointing materials, and secondarily to provide a factor of safety, they shall not be applied until after leakage tests have been completed and have been accepted by Engineer. Also, do not apply epoxy coatings until tests have been completed.
- B. Every test must be witnessed by Engineer and any test not so witnessed will be considered as not having been performed. Pretest the Work until it is reasonably certain that the test will yield results within the acceptable limits.

1.04 SUBMITTALS

- A. See Section 01 3000.
- B. Complete details and specifications on testing apparatus.
- C. Certified test results on forms approved by Engineer.

1.05 SEQUENCING AND SCHEDULING

- A. Notify Engineer at least 48 hours in advance of a scheduled test so that the test may be witnessed.
- B. Do not apply epoxy coatings or joint fillers until leakage tests have been completed, passed, and accepted by Engineer.
- C. If any pretest does not meet the leakage requirements, cease installations until the reasons for failure are determined, the conditions rectified, and the test rerun and satisfactorily passed.
- D. No structure or tank shall be backfilled, insulated, concealed or furred in until it has passed all tests.

PART 2 MATERIALS

2.01 TESTING APPARATUS

- A. Provide labor, pumps, plugs, measuring equipment and other apparatus, complete, and as required to perform testing.
- B. Provide testing fluid, air, nitrogen and other materials as required to accomplish testing.
- C. Provide plugs and caps capable of withstanding the test pressures.
- D. Provide temporary flanges, plugs, bulkheads, thrust, blocks, weighing, bracing and other items necessary to prevent joints from separating, and to prevent any injuries or damage.

PART 3 EXECUTION

3.01 PREPARATION

- A. Inspections - Given ample notice, Engineer will conduct his inspection of structures and tanks prior to the performance of leakage tests. If the inspections are not completed before leakage testing, and subsequent modifications are made to a structure or tank, the item shall be retested for leakage.
- B. Bracing for Pressure - Provide bracing as required so that items to be tested will safely withstand the pressures developed under the tests and so that no damage or injury will occur to the Work, people, or property.
- C. Protection - Before tests are conducted, isolate or remove any regulator, gauge, trap, or other apparatus or equipment which may be damaged by test pressures.

3.02 GENERAL

- A. Trapped Air - Trapped air may cause a false indication of the rate of leakage. No credit will be made for this condition and no adjustment will be made to the allowable leakage. Where trapped air is suspected of causing a test failure, do whatever is necessary to evacuate the air and repeat the tests until the actual leakage is equal to or less than the allowable rate of leakage.
- B. Water Absorption - No credit will be given for absorption of water into materials. If necessary, fill with water well in advance of testing in order to eliminate or minimize the effects of absorption.
- C. Evaporation - Precipitation - Where tests may be affected by the elements, provide a watertight container, acceptable to Engineer, which will be used to measure and estimate the effects of evaporation and precipitation.
- D. Exfiltration Tests - Leakage shall be determined by exfiltration testing. Engineer reserves the right to require infiltration testing.
 - 1. Determine groundwater levels by installing test holes, test pits, or perforated observation wells fitted with screens at the bottom.
 - 2. Fill structures to be tested to 12 inches above their maximum operating levels,

except where weirs control the depth, and then to the maximum weir setting.

3. The minimum water level required for testing is 4 feet above the maximum groundwater level. Where this is not possible, Engineer will prescribe test modifications, require infiltration testing, or require that other methods of testing be utilized.
4. For potable water facilities, use good quality, clean water for testing. For sewage, sludge, or other waste facilities, use relatively clean water, such as from surface waters. In sewage lagoons, sewage may be used provided that it can be properly disposed of after each test.
5. Unless otherwise approved in advance by Engineer, each structure or tank shall be tested separately.

3.03 ALLOWABLE LEAKAGE

- A. The maximum allowable leakage for the various systems is contained on the form LEAKAGE TESTING REQUIREMENTS, attached to this Section.
- B. It is the intent of this Contract to secure systems with leakage, in each structure, equal to, or less than that specified. It is also the intent to secure a system free from visible drips, streams, and leaks. Therefore, even if a portion of the system meets the requirements for allowable leakage, visible leaks are not permitted and shall be stopped.
- C. Leakage tests will be considered satisfactorily passed when the rate of leakage is equal to or less than the stipulated allowances, there is no evidence of visible leaks, and there is no evidence of other system defects.

3.04 REPAIRS/REPLACEMENTS/RETESTING

- A. Structures not passing the tests shall have defects corrected to the satisfaction of Engineer, and shall be retested and recorrected as often as is necessary until the test requirements have been met.
- B. It is the intent of this Contract to obtain work meeting test requirements on their own and solely through the use of the normal integral sealing components. However, in certain instances, Engineer may approve the use of epoxy coatings, epoxy injections, or other long-term solutions for eliminating or reducing leakage.
- C. Methods other than rejoining, resetting or replacing joint seals shall require the written approval of Engineer.

LEAKAGE TESTING REQUIREMENTS

STRUCTURE MAT'L	DURATION (2)	ALLOWABLE LEAKAGE (1)
CONCRETE		
Exposed	2-DAYS	0.10%
Epoxy Coated	2-DAYS	None

STEEL	24-HOURS	None
PLASTIC/FRP	24-HOURS	None
RUBBER/PLASTIC LINED	7-DAYS	0.01%

-----NOTES-----

1. Percentage of total test volume.
2. Times shown are consecutive times.

VISIBLE DRIPS, LEAKS, STREAMS OR RUNNING WATER ARE NOT PERMITTED.

END OF SECTION

SECTION 01 7000
EXECUTION REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Examination, preparation, and general installation procedures.
- B. Pre-installation meetings.
- C. Cutting and patching.
- D. Surveying for laying out the work.
- E. Cleaning and protection.
- F. Starting of systems and equipment.
- G. Demonstration and instruction of Owner personnel.
- H. Closeout procedures, except payment procedures.

1.02 RELATED REQUIREMENTS

- A. Section 01 1300 - Surveys and Layouts.
- B. Section 01 3000 - Administrative Requirements: Submittals procedures.
- C. Section 01 4000 - Quality Requirements: Testing procedures.
- D. Section 01 5000 - Temporary Facilities and Controls: Temporary exterior enclosures.
- E. Section 01 5100 - Temporary Utilities: Temporary heating, cooling, and ventilating facilities.
- F. Section 01 7100 – Cleaning.
- G. Section 01 7800 - Closeout Submittals: Project record documents, operation and maintenance manuals, warranties, and facilities start up.
- H. Individual Product Specification Sections.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Survey work: See section 01 1300 - Surveys and Layouts
- C. Cutting and Patching: Submit written request in advance of cutting or alteration that affects:
 - 1. Structural integrity of any element of Project.
 - 2. Integrity of weather exposed or moisture resistant element.
 - 3. Efficiency, maintenance, or safety of any operational element.
 - 4. Visual qualities of sight exposed elements.

5. Work of Owner or separate Contractor.
6. Include in request:
 - a. Identification of Project.
 - b. Location and description of affected work.
 - c. Necessity for cutting or alteration.
 - d. Description of proposed work and products to be used.
 - e. Alternatives to cutting and patching.
 - f. Effect on work of Owner or separate Contractor.
 - g. Written permission of affected separate Contractor.
 - h. Date and time work will be executed.
- D. Project Record Documents: Accurately record actual locations of capped and active utilities.

1.04 QUALIFICATIONS

- A. For Survey work, see Section 01 1300;
- B. For field engineering, employ a professional engineer of the discipline required for specific service on Project, licensed in the State of Maine.

1.05 PROJECT CONDITIONS

- A. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.
- B. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.
- C. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
- D. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.
- E. Erosion and Sediment Control: Plan and execute work by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.
 1. Minimize amount of bare soil exposed at one time.
 2. Provide temporary measures such as berms, dikes, and drains, to prevent water flow.
 3. Construct fill and waste areas by selective placement to avoid erosive surface silts or clays.
 4. Periodically inspect earthwork to detect evidence of erosion and sedimentation;

promptly apply corrective measures.

- F. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.
- G. Rodent Control: Provide methods, means, and facilities to prevent rodents from accessing or invading premises.
- H. Pollution Control: Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations. Comply with federal, state, and local regulations.

1.06 COORDINATION

- A. Coordinate scheduling, submittals, and work of the various sections of the Contract Documents to ensure efficient and orderly sequence of installation of interdependent construction elements.
- B. Notify affected utility companies and comply with their requirements.
- C. Coordinate work of alterations and renovations to expedite completion.
- D. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
- E. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- F. In finished areas, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
- G. Coordinate completion and clean-up of work of separate sections.
- H. After Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

1.07 STARTUP OF EQUIPMENT

- A. Each item of equipment shall be started up and fully tested and adjusted by the Contractor to the satisfaction of the Engineer, including lubrication and preoperative maintenance. Where specified by the manufacturer, or when directed by the Owner, a factory representative shall be present for adjustment, startup and instruction of personnel. All spare parts, lubricants, oils filters, etc., O&M Manuals, and all tools shall be onsite and accepted before the Certification of Substantial Completion will be issued.
- B. Following or concurrent with starting of individual equipment items, as directed by the

Engineer, the units shall be filled by the Contractor with clean water or river water free of silt, checked for leakage, controls, operation, etc. Any permitting and/or coordination associated with filling units for testing is the responsibility of the Contractor.

- C. The supplier of the equipment shall provide the field service, as specified, to setup, adjust, check, and startup the system, to the satisfaction of the Engineer. At this time, the Owner's Operator of the system shall be trained by the serviceman in the operation and maintenance of the equipment. The serviceman shall forward a report to the Engineer stating any defects or that the equipment and system is in working order as specified. The Contractor shall correct any defects in installation and obtain a certificate from the supplier or manufacturer that the defects have been corrected and the equipment or system is ready for operation and subject to the condition of the guarantee.

PART 2 PRODUCTS

2.01 PATCHING MATERIALS

- A. New Materials: As specified in product sections; match existing products and work for patching and extending work.
- B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.
- C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01 6000.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.
- B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.
- C. Examine and verify specific conditions described in individual specification sections.
- D. Verify that demolition is complete in alterations areas and areas are ready for installation of new work.
- E. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or mis-fabrication.
- F. Verify that utility services are available, of the correct characteristics, and in the correct locations.
- G. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.02 PREPARATION

- A. Cut, move, or remove items as necessary for access to alterations and renovation work. Replace and restore at completion.
- B. Remove unsuitable material not marked for salvage, such as rotted wood, corroded metals, and deteriorated masonry and concrete. Replace materials as specified for finished work.
- C. Remove debris and abandoned items from area and from concealed spaces.
- D. Close openings in exterior surfaces to protect existing work from weather and extremes of temperature and humidity. Insulate ducts and piping to prevent condensation in exposed areas.
- E. Prepare surfaces and remove surface finishes to provide for proper installation of new work and finishes.
- F. Clean substrate surfaces prior to applying next material or substance.
- G. Seal cracks or openings of substrate prior to applying next material or substance.
- H. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.03 PREINSTALLATION MEETINGS

- A. When required in individual specification sections, convene a preinstallation meeting at the site prior to commencing work of the section.
- B. Require attendance of parties directly affecting, or affected by, work of the specific section.
- C. Notify Engineer four days in advance of meeting date.
- D. Prepare agenda and preside at meeting:
 - 1. Review conditions of examination, preparation and installation procedures.
 - 2. Review coordination with related work.
- E. Record minutes and distribute copies within three days after meeting to participants, with 3 copies to Engineer, Owner, participants, and those affected by decisions made.

3.04 LAYING OUT THE WORK

- A. Verify locations of survey control points prior to starting work.
- B. Promptly notify Engineer of any discrepancies discovered.
- C. Contractor shall locate and protect survey control and reference points.
- D. Control datum for survey is that indicated on Drawings.
- E. Protect survey control points prior to starting site work; preserve permanent reference points during construction.
- F. Promptly report to Engineer the loss or destruction of any reference point or relocation

required because of changes in grades or other reasons.

- G. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Engineer.
- H. Utilize recognized engineering survey practices.
- I. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:
 - 1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations; and other structures or piping systems.
- J. Periodically verify layouts by same means.
- K. Maintain a complete and accurate log of control and survey work as it progresses.

3.05 GENERAL INSTALLATION REQUIREMENTS

- A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.
- B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.
- C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.
- D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.
- E. Make neat transitions between different surfaces, maintaining texture and appearance.

3.06 ALTERATIONS

- A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
 - 1. Verify that construction and utility arrangements are as shown.
 - 2. Report discrepancies to Engineer before disturbing existing installation.
- B. Remove existing work as indicated and as required to accomplish new work.
 - 1. Remove items indicated on drawings.
 - 2. Relocate items indicated on drawings.
 - 3. Where new surface finishes are not specified or indicated, patch holes and damaged surfaces to match adjacent finished surfaces as closely as possible.
- C. Protect existing work to remain.
 - 1. Prevent movement of structure; provide shoring and bracing if necessary.
 - 2. Perform cutting to accomplish removals neatly and as specified for cutting new

work.

3. Repair adjacent construction and finishes damaged during removal work.
- D. Patching: Where the existing surface is not indicated to be refinished, patch to match the surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.
- E. Clean existing systems and equipment.
- F. Remove demolition debris and abandoned items from alterations areas and dispose of off-site; do not burn or bury.
- G. Do not begin new construction in alterations areas before demolition is complete.
- H. Comply with all other applicable requirements of this section.

3.07 CUTTING AND PATCHING

- A. Whenever possible, execute the work by methods that avoid cutting or patching.
- B. See Alterations article above for additional requirements.
- C. Perform whatever cutting and patching is necessary to:
 1. Complete the work.
 2. Fit products together to integrate with other work.
 3. Provide openings for penetration of mechanical, electrical, and other services.
 4. Match work that has been cut to adjacent work.
 5. Repair areas adjacent to cuts to required condition.
 6. Repair new work damaged by subsequent work.
 7. Remove samples of installed work for testing when requested.
 8. Remove and replace defective and non-conforming work.
- D. Execute cutting and patching to complete the work, to uncover work in order to install improperly sequenced work, to remove and replace defective or non-conforming work, to remove samples of installed work for testing, to provide openings in the work for penetration of mechanical and electrical work, to execute patching to complement adjacent work, and to fit products together to integrate with other work.
- E. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing.
- F. Employ skilled and experienced installer to perform cutting.
- G. Cut rigid materials using appropriate saws or core drills. Pneumatic tools not allowed without prior approval.
- H. Restore work with new products in accordance with requirements of Contract Documents.

- I. Patching:
 - 1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
 - 2. Match color, texture, and appearance.
 - 3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.
- J. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
- K. Make neat transitions. Patch work to match adjacent work in texture and appearance. Where new work abuts or aligns with existing, perform a smooth and even transition.
- L. Patch or replace surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. Repair substrate prior to patching finish. Finish patches to produce uniform finish and texture over entire area. When finish cannot be matched, refinish entire surface to nearest intersections.

3.08 PROTECTION OF INSTALLED WORK

- A. Protect installed work from damage by construction operations.
- B. Provide special protection where specified in individual specification sections.
- C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
- D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- F. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
- G. Prohibit traffic from landscaped areas.
- H. Remove protective coverings when no longer needed; reuse or recycle plastic coverings if possible.

3.09 SYSTEM STARTUP

- A. Coordinate schedule for start-up of various equipment and systems.
- B. Notify Engineer and owner five days prior to start-up of each item.
- C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.

- D. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
- E. Verify that wiring and support components for equipment are complete and tested.
- F. Execute start-up under supervision of applicable Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.
- G. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.
- H. Submit a written report that equipment or system has been properly installed and is functioning correctly.

3.10 DEMONSTRATION AND INSTRUCTION

- A. Demonstrate operation and maintenance of products to Owner's personnel 5 days prior to date of Substantial Completion.
- B. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at scheduled time, at equipment location.
- C. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.
- D. Provide a qualified manufacturer's representative who is knowledgeable about the Project to perform demonstration and instruction of owner personnel.
- E. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owner's personnel in detail to explain all aspects of operation and maintenance.
- F. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.
- G. The amount of time required for instruction on each item of equipment and system is that specified in individual sections.

3.11 ADJUSTING

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

END OF SECTION

SECTION 01 7100

CLEANING

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work included:

1. Maintaining premises and public properties.
2. Final clean up.

B. Related requirements specified elsewhere:

Temporary Facilities and Controls	01 5000
Execution Requirements	01 7000
Cleaning of Specific Products or Work	Specification Section for that Work

1.02 QUALITY ASSURANCE

- A. Maintain the Work site in a clean condition at all times.
- B. Upon written notice from the Engineer to perform cleaning as specified herein, the Contractor shall have twenty-four hours to comply. If Contractor fails to comply, then Owner may perform whatever work is necessary by whatever means he may deem expedient, and all expenses incurred by Owner will be charged to and paid for by the Contractor.

1.03 SAFETY REQUIREMENTS

- A. Maintain project in accordance with U.S. Department of Labor, Safety and Health Regulations, CFR 20 Part 1926 and all subsequent amendments.
- B. Store volatile wastes in covered metal containers.
- C. Prevent accumulations of wastes which create hazardous conditions.
- D. Provide adequate ventilation during use of volatile or noxious substances.
- E. Conduct cleaning and disposal operations to comply with local and state ordinances and anti-pollution laws and as approved by the Engineer.
 1. Do not dispose of volatile wastes such as mineral spirits, oil, or paint thinner in storm or sanitary drains.
 2. Do not dispose of wastes into streams or waterways.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Use only cleaning materials recommended by manufacturer of surface to be cleaned.

- B. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

PART 3 - EXECUTION

3.01 DURING CONSTRUCTION

- A. Execute cleaning to ensure that building, grounds, and public properties are maintained free from accumulations of waste materials and rubbish.
- B. Wet down dry materials and rubbish to lay dust and prevent blowing dust.
- C. Clean site and public properties, and dispose of waste materials, debris and rubbish daily.
- D. Dispose of waste materials, debris and rubbish in an acceptable manner.
- E. Handle materials in a controlled manner with as few handlings as possible; do not drop or throw materials from heights.
- F. Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not fall on wet, newly painted surfaces.

3.02 FINAL CLEANING

- A. In preparation for Substantial Completion or occupancy, conduct final inspection of sight-exposed interior and exterior surfaces, and of concealed spaces.
- B. Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials, from sight-exposed interior and exterior finished surfaces.
- C. Repair, patch and touch up marred surfaces to specified finish, to match adjacent surfaces.
- D. Broom clean surfaces; rake clean other surfaces of grounds.
- E. Remove snow and ice from building access.
- F. Tear down, remove and dispose of all temporary buildings and structures as approved by the Engineer.
- G. Upon removal of temporary toilet facility, remove, disinfect, and cover all organic matter as approved by the Engineer.
- H. Remove all tools, equipment, machinery and surplus materials from the project.
- I. Restore to a condition equal to the original condition, all portions of the site not designated for alteration and all public and private property that was damaged.
- J. Maintain cleaning until project or portion thereof, is occupied by Owner.

END OF SECTION

SECTION 01 7800
CLOSEOUT SUBMITTALS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Project Record Documents.
- B. Operation and Maintenance Data.
- C. Warranties and bonds.
- D. Spare Parts and Materials
- E. Special Tools
- F. Lubricants
- G. Facilities Startup

1.02 RELATED REQUIREMENTS

- A. Section 01 3000 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.
- B. Section 01 7000 - Execution Requirements: Contract closeout procedures.
- C. Individual Product Sections: Specific requirements for operation and maintenance data.
- D. Individual Product Sections: Warranties required for specific products or Work.

1.03 SUBMITTALS

- A. Project Record Documents: Submit documents to Engineer with claim for final Application for Payment.
- B. Operation and Maintenance Data:
 - 1. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Engineer will review draft and return one copy with comments.
 - 2. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
 - 3. Submit one copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Engineer comments. Revise content of all document sets as required prior to final submission.
 - 4. Submit two sets of revised final documents in final form within 10 days after final inspection.
- C. Warranties and Bonds:

1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within 10 days after acceptance.
 2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
 3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.
- D. Other Items:
1. Spare Parts: Deliver spare parts to Owner prior to Final Completion Inspection.
 2. Special Tools: Deliver special tools to Owner prior to Final Completion Inspection.
 3. Lubricants: Deliver required lubricants to Owner prior to Final Completion Inspection.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PROJECT RECORD DOCUMENTS

- A. Maintain on site one set of the following record documents; record actual revisions to the Work:
1. Drawings.
 2. Specifications.
 3. Addenda.
 4. Change Orders and other modifications to the Contract.
 5. Reviewed shop drawings, product data, and samples.
 6. Manufacturer's instruction for assembly, installation, and adjusting.
- B. Ensure entries are complete and accurate, enabling future reference by Owner.
- C. Store record documents separate from documents used for construction.
- D. Record information concurrent with construction progress.
- E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
1. Manufacturer's name and product model and number.
 2. Product substitutions or alternates utilized.
 3. Changes made by Addenda and modifications.
- F. Record Drawings and Shop Drawings: Legibly mark each item to record actual

construction including:

1. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
2. Field changes of dimension and detail.
3. Details not on original Contract drawings.

3.02 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

- A. For Each Item of Equipment and Each System:
 1. Description of unit or system, and component parts.
 2. Identify function, normal operating characteristics, and limiting conditions.
 3. Include performance curves, with engineering data and tests.
 4. Complete nomenclature and model number of replaceable parts.
- B. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed.
- C. Include color coded wiring diagrams as installed.
- D. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.
- E. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and troubleshooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- F. Provide servicing and lubrication schedule, and list of lubricants required.
- G. Include manufacturer's printed operation and maintenance instructions.
- H. Include sequence of operation by controls manufacturer.
- I. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- J. Provide control diagrams by controls manufacturer as installed.
- K. Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- L. Include test and balancing reports.
- M. Additional Requirements: As specified in individual product specification sections.

3.03 OPERATION AND MAINTENANCE MANUALS

- A. Prepare instructions and data by personnel experienced in maintenance and operation of described products.

- B. Binders: Commercial quality, 8-1/2 by 11 inch three D side ring binders with durable plastic covers; 2 inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.
- C. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.
- D. Provide tabbed dividers for each separate product and system, with typed description of product and major component parts of equipment.
- E. Text: Manufacturer's printed data, or typewritten data on 24 pound paper.
- F. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
- G. Arrange content by systems under section numbers and sequence of Table of Contents of this Project Manual.
- H. Contents: Prepare a Table of Contents for each volume, with each product or system description identified, in three parts as follows:
 - 1. Part 1: Directory, listing names, addresses, and telephone numbers of Engineer, Contractor, Subcontractors, and major equipment suppliers.
 - 2. Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
 - a. Significant design criteria.
 - b. List of equipment.
 - c. Parts list for each component.
 - d. Operating instructions.
 - e. Maintenance instructions for equipment and systems.
 - 3. Part 3: Project documents and certificates, including the following:
 - a. Shop drawings and product data.
 - b. Certificates.
 - c. Photocopies of warranties and bonds.

3.04 WARRANTIES AND BONDS

- A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until the Date of Substantial Completion is determined.
- B. Verify that documents are in proper form, contain full information, and are notarized.

- C. Co-execute submittals when required.
- D. Retain warranties and bonds until time specified for submittal.
- E. Manual: Bind in commercial quality 8-1/2 by 11 inch three D side ring binders with durable plastic covers.
- F. Cover: Identify each binder with typed or printed title WARRANTIES AND BONDS, with title of Project; name, address and telephone number of Contractor and equipment supplier; and name of responsible company principal.
- G. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Project Manual, with each item identified with the number and title of the specification section in which specified, and the name of product or work item.
- H. Separate each warranty or bond with index tab sheets keyed to the Table of Contents listing. Provide full information, using separate typed sheets as necessary. List Subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

3.05 SPARE PARTS AND MATERIALS

- A. Provide spare parts and materials that are normally furnished at no extra cost and that are specified to be furnished by the Specifications.
- B. Deliver, handle and protect parts and materials as specified in Section 01 6000.
- C. Distribute and store in locations as directed by the Owner.

3.06 SPECIAL TOOLS

- A. Furnish one set of special tools or devices for each type of equipment that is necessary for its proper operation and/or maintenance.
- B. Tools shall be high grade, smooth, forged, alloy tool-steel.
- C. Grease guns shall be lever type.

3.07 LUBRICANTS AND FACILITIES STARTUP

- A. Furnish one year supply of lubricants necessary for proper lubrication of all equipment.
- B. Lubricants shall be as recommended by Manufacturers.
- C. Furnish in approved containers and store as directed by Owner.
- D. Furnish all liquids and materials required to operate and maintain the facilities for the initial startup period. Fill all units with appropriate liquids or materials as recommended by manufacturer.
- E. Pay all costs associated with facilities startup and testing.

END OF SECTION

SECTION 09 9100

PAINTING

PART 1 – GENERAL

1.01 DESCRIPTION

- A. Work covered by this Section includes the furnishing and application of paints, stains, primers, varnishes and other finish, decorative, and protective coatings.
- B. Shop priming and factory prefinishing and are required on some, but not necessarily all, of the items described in other Sections.
- C. Unless specifically stated otherwise, do not paint glass, aluminum, copper, plastics, bronze, and stainless steel surfaces, items specifically called for and furnished with finished factory coatings, suspended ceilings, and acoustical tiles.
- D. Definition - The term "paint" as used herein, includes enamels, paints, sealers, fillers, emulsions, stains, varnishes and other coatings, whether used as a prime, an intermediate, or a finish coat.
- E. Paint which will come in contact with potable water shall be as approved for this use with National Sanitation Foundation (N.S.F.).

1.02 ACCEPTABLE MANUFACTURERS

- A. General - The attached PAINTING SCHEDULE 09200 contains manufacturers names and product designations to indicate type and quality required. Products of the following, and any other manufacturers, may be acceptable provided that they are equivalent to those specifically named herein.
- B. Stains, Varnish, Polyurethane Coatings - The Rez Company, Olympic Stain (Div. of Comerco, Inc.), Sherwin - Williams, and Darworth Co., or approved equal.
- C. Other Paints - Tnemec Co., Inc., Koppers Co., Inc., Sherwin Williams, Rustoleum Corp. and Valspar Co., or approved equal.
- D. Epoxy Modified Cement - Tnemec Co., Inc., or approved equal.
- E. Moisture Vapor Transmission Barrier and Alkalinity Control - Koester American Corp., or approved equal.

1.03 QUALITY ASSURANCE

- A. For mixing and applying paints, use only thoroughly trained and experienced painters who are completely familiar with the application and care of paints, with the manufacturer's recommendations and with the requirements of the Contract Documents.
- B. Since factory priming is required in several instances, coordinate with the manufacturers and fabricators and verify that required primers are being used and that they are

compatible and acceptable to the manufacturer of the specified and proposed top coats.

- C. Where wet film and dry film thicknesses are not specified, they shall be as recommended by the paint manufacturers, adequate for the purpose intended, and sufficient to get full coverage without voids and to produce the proper color, subject to the acceptance of Engineer.
- D. Finished edges of coatings shall form straight and level lines. Finished surfaces shall be uniform in color and free from drips, sags, ridges, thin spots, brush marks, blemishes and other like items which make the work deficient in quality or poor in appearance.
- E. In addition to the technical and other provisions of the Contract Documents, the final acceptance of painting will also be based upon appearance. Engineer reserves the right to reject any part or all of the painting based solely upon appearance.
- F. No paint containing lead will be accepted.
- G. Unless otherwise indicated, the finish color coat for paint shall be enamel or semigloss.

1.04 SUBMITTALS

- A. See Section 01300.
- B. Color charts showing full range of colors available. The Engineer will select colors from the manufacturers' standard colors.
- C. Manufacturer's recommended preparation, mixing, thinning and application instructions.
- D. Catalog cuts of materials proposed for use.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver and store paint materials in their original, unopened containers with all labels intact and legible at the time of use. Maximum container capacity shall be 5 gallons.
- B. Store only approved materials at the Project site and store only in a designated area restricted to the storage and mixing of paint materials and related equipment.
- C. Use all means necessary to ensure the safe storage and use of paint materials and the prompt and safe disposal of waste.
- D. Protect materials to prevent spontaneous combustion and contamination by extraneous materials in accordance with fire codes. Provide proper containers outside of the buildings for painting wastes. No plumbing fixture shall be used for this purpose.
- E. Follow all recommendations of the paint manufacturer in regards to health and safety of workmen.
- F. Use all means necessary to protect paint materials before, during and after application and to protect the installed work and materials of other trades.

1.06 EXTRA PAINT

Furnish one unopened gallon can of each type and color paint used, complete with application instructions and manufacturer's brand and name printed on each can.

PART 2 - PRODUCTS

2.01 PAINTS

- A. Schedule - The attached PAINTING SCHEDULE 09200 lists acceptable products and the number of coats required, based upon the use of those products. Use of other products may require additional coats to produce an equivalent coating.
- B. Compatibility - Where possible, use the product of a single manufacturer for all coats. Paint materials and equipment shall be compatible in use; finish coat shall be compatible with intermediate coat, intermediates with prime coats, prime coats with the surface to be coated. Tools and equipment shall be compatible with the coating to be applied.
- C. Multicomponent Coatings - Mix in strict accordance with manufacturer's recommendations. Discard Coating once pot life has been exceeded even though it may still appear satisfactory.

2.02 THINNERS

- A. Do not use a thinner, unless absolutely necessary, and then only with the manufacturer's recommended type and quantity of thinner.

2.03 APPLICATORS

- A. Manual - Use properly sized brushes, rollers and squeegees of materials best suited for the particular paint. Keep clean and in good condition.
- B. Spray - With the prior approval of Engineer, motor driven spraying equipment of adequate type and capacity may be acceptable for use in certain applications. Use paint containers fitted with efficient agitators.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Prior to the work of this Section, carefully inspect the installed work of other trades and verify that such work is complete to the point where this work may properly commence.
- B. Verify that paint finishes may be applied in accordance with pertinent codes and regulations, the recommendations of the manufacturers, and with the requirements of the Contract Documents.
- C. Do not proceed until conditions are satisfactory.

3.02 PREPARATION - GENERAL

- A. The procedures outlined in this Part 3 are abbreviated and may not agree with the manufacturer's recommendations. The intent of this Section is to secure excellent, top quality decorative and protective coatings. Comply with the manufacturers' approved recommendations except when the requirements of this Section are more stringent, then this Section shall take precedence.
- B. Prior to surface preparations and painting applications, mask, remove or otherwise adequately protect hardware, accessories, machined or operating surfaces, plates, lighting fixtures and similar items in contact with painted surfaces, but not scheduled to receive paint. Tape only around major items which cannot easily be removed; otherwise, remove all items, paint and replace to insure that unpainted surfaces do not show if the item should be shifted.
- C. Spot prime exposed nails, bolts, staples and other metals which are to be painted with emulsion paints, using a primer recommended by the manufacturer of the coating system.
- D. Before applying paint or other surface treatment, thoroughly clean surfaces until they are free from dirt, rust, oil, grease, wax, mildew, mold and other foreign substances which may adversely affect paint adhesion, quality, color or appearance.
- E. Schedule cleaning and painting so that dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.
- F. On factory primed items, remove all drips, sags, scrapes and other defects which may have occurred during or after the priming process. Touch up unprimed areas.

3.03 PREPARATION - WOOD SURFACES

- A. After cleaning, smooth exposed wood surfaces to be painted, except those specifically designed or specified to be left rough.
- B. Use sandpaper, varying in degree of coarseness, to produce uniformly smooth and unmarred surfaces. Sand only in the direction of the grain.
- C. On small, dry, seasoned knots, thoroughly scrap and clean the surface and apply one coat of good quality knot-sealer before application of the primer coat (omit when using clear or stained finishes).
- D. One large, open, unseasoned knot, scrape off all pitch and thoroughly clean the area, followed by an application of one coat of good quality knot sealer (omit when using clear or stained finishes).
- E. Remove and treat all pitch surfaces as required for large knots.
- F. Make sure nails and like items have been set and puttied. If not, carefully set nails and fill with putty. Smooth putty flush with surrounding surfaces. Use colored putty on surfaces to be left natural, coated clear or stained. On stained wood, use a putty

which matches the final stain color and on natural or clear finishes, match putty color to the wood.

- G. Do not proceed with the painting until the moisture content of the wood is 12% or below. Use a moisture-meter when in doubt or when directed by Engineer.

3.04 PREPARATION - FERROUS SURFACES

- A. Blast clean all ferrous metals which will be submerged to nearwhite metal in accordance with SSPC-SP10.
- B. Power tool clean all ferrous metals which will be subject to splash in accordance with SSPC-SP3.
- C. Power or hand tool clean all other ferrous metals in accordance with SSPC-SP3 or SSPC-SP2.

3.05 PREPARATION - STAINLESS STEEL

Solvent clean stainless steel items indicated to be coated in accordance with SSPC-SP1 using only solvents and cleaning solutions containing less than 200 ppm of halogen.

3.06 PREPARATION - GALVANIZED STEEL AND OTHER NONFERROUS METALS

Remove dust and dirt by blowing off the surface with high pressure air, remove oil, grease and protective mill coatings with solvent cleaners in accordance with SSPC-SP1. Rust shall be removed by hand or power brushing in accordance with SSPC-SP2 or SP3. Apply one coat of passivator to galvanized surfaces prior to painting.

3.07 PREPARATION - PVC

Thoroughly clean to remove any oils, residue or excess solvent. Lightly sand with medium sandpaper or steel wool to roughen surface and wipe down with dry rag to remove dust and plastic particles.

3.08 PREPARATION - CONCRETE SURFACES

- A. Thoroughly clean to remove loose mortar, efflorescence, form releasing agents, curing compounds, dirt, oil, grease and other such substances.
- B. Wash concrete floors with fresh water and allow to dry until the surface is just damp. Apply an acid etching solution of 1 part Muriatic Acid to 3 or 4 parts fresh water. Once bubbling action begins to subside, rinse surface with clean water and scrub with a stiff bristle broom. Continue until a pH reading of 7 or greater is obtained.
- C. Sandblast, waterblast, or use other methods as recommended by the coating manufacturer for all other concrete surfaces.
- D. Allow new concrete to age for the minimum period of time as recommended by the manufacturer. The Engineer may require the concrete to be tested for moisture content prior to coating to ensure its suitability.

3.09 PAINT APPLICATION

- A. Performance - Perform work in a manner so that the finished surfaces will be free from runs, drops, sags, ridges, waves, laps, unnecessary applicator marks, misses, thin spots and other such defects. Apply paint to produce an even film of uniform thickness completely coating all corners and crevices.
- B. Environmental Conditions - Do not paint when:
 - 1. Dust is being generated.
 - 2. Other construction may interfere with or damage the painting.
 - 3. Weather is moist, humid or raining (exterior painting).
 - 4. Temperatures are below 50 degrees F or very hot.
 - 5. Wind velocities are above 15 mph (exterior spray applications).
 - 6. Interior of building is not thoroughly dry (interior painting).
 - 7. Surfaces and paint are not at ambient temperature.
 - 8. There is insufficient ventilation to remove fumes and to promote drying.
- C. Application - Thoroughly and smoothly apply paint in a uniform film without sags, runs or applicator marks and at a rate so as to obtain a coverage per gallon recommended by the manufacturer. Varnish and enamel shall be flowed on and carefully brushed out. Tint each coat to distinguish it from the proceeding coat.
- D. Drying and Sanding - Allow ample drying time between each coat. Modify the period as recommended by the manufacturer to suit adverse weather conditions. Lightly sand excessively glossy coats to provide a surface suitable for the proper application and adhesion of subsequent coats. Thoroughly dust and clean surfaces immediately prior to the application of each coat.

3.10 COLOR CODING AND IDENTIFICATION OF PIPES

- A. Non-Ferrous Piping Systems - All unpainted exposed interior and exterior piping, valves and appurtenances shall be identified with colored PVC bands, pressure-sensitive tapes or other materials suitable for the intended purpose, subject to the approval of Engineer. Bands shall wrap completely around the pipe, have an 8" minimum width and contain the pipe symbol and an arrow indicating the direction of flow. Locate bands along pipelines at no more than 10' on centers, and more often when necessary to clearly identify the pipeline. The band shall be the color designated for the pipe. Painted non-ferrous piping and appurtenances shall be identified as detailed in 3.10 B.
- B. Ferrous Piping Systems - Exposed interior and exterior piping, valves and appurtenances shall be painted in accordance with the "Piping Color Code" attached. Stencil the pipe

symbol and an arrow indicating the direction of flow on the pipeline at no more than 10' on centers, and more often when necessary to clearly identify the pipeline.

- C. Insulated Piping Systems - Independent of pipe material, paint insulated piping systems as specified in Par. 3.09 B., except when using non-paintable insulation, then identify pipelines in accordance with Par. 3.09 A.
- D. Lettering Size - The pipe symbol letters shall be in accordance with American National Standards Institute, scheme for Identification of Piping Systems, A 13.1 - 1956.
- E. Valve Identification - Identify valves larger than 3-inches with numerical numbers painted on each side. The size lettering shall be in accordance with A.N.S.I., A13.1 - 1956. The numbering schedule will be furnished by the Engineer during construction. Identify valves 3-inches and smaller by numbering on approved metal or plastic tags attached to the valve by a chain made for such purpose.
- F. Arrow Size - Sufficient to clearly indicate the direction(s) of flow. Use flow diagrams shown on the Drawings to help determine the proper direction of flow.
- G. Orientation - Orient lettering and arrows so that they are clearly visible from the normal walkway or operating areas.
- H. Omissions - It is the intent that all exposed pipelines, interior or exterior, be color coded and identified. Should a new line be added to the Contract or should a pipeline not be shown on the "Piping Color Code", immediately notify Engineer and he will designate the colors and symbols to be used.

3.11 ADJUST AND CLEAN

- A. Touch-up and repair any coated surfaces which may have become scratched, marred or otherwise damaged or which contain defects such as sags, drips, ridges, thin spots or the like.
- B. Clean spattered and dripped paint from the Work. Take care not to damage finishes in the process.

PAINTING SCHEDULE 09200 - 1

MANUFACTURER'S PRODUCTS		
"OR APPROVED EQUAL" SHALL APPLY TO ALL LISTED MANUFACTURES		
CODE	PRODUCTS	MINIMUM DRY FILM THICKNESS PER COAT*
A.	Tnemec 36-603 Undercoated	2.0
	Koppers 625 Undercoated	2.0
	Valspar 17-W-4 or 47-W-5	2.0
	Sherwin – Williams A-100 Oil Primer Y24	2.0
B.	Tnemec Series 2 Tneme-Gloss	2.0
	Koppers Glamortex 501	2.0
	Valspar 20 Series M and F	2.0
	Sherwin – Williams SWP Oil House Paint A2	2.0
C.	Tnemec 54-562	8.0
	Koppers Block Filler	8.0
	Valspar 74-W-8	8.0
	Sherwin - Williams Heavy Duty Block Filler B42	8.0
D.	Tnemec Series 66 Epoxoline	4.0
	Koppers Glamorglaze	4.0
	Valspar 84 Series	4.0
	Sherwin - Williams Heavy Duty Epoxy B67	4.0
E.	Tnemec Series 52 Tneme-Crete	8.0
	Koppers Koppers Surfacer	8.0
	Valspar 79-W-8	8.0
	Sherwin - Williams Sher - Crete B61	8.0
F.	Tnemec 37-77 Chem-Prime	2.0
	Koppers Koppers 600 Exterior	2.0
	Valspar 79 Series	2.0

	Sherwin - Williams Kem Kromik	2.0
	Metal Primer B50	2.0
G.	Tnemec 37-77 Chem-Prime	2.0
	Koppers PUG Primer	2.0
	Valspar 13-R-50	2.0
	Sherwin - Williams Kem Kromik	2.0
	Metal Primer B50	2.0
H.	Tnemec 51-792 Primer Sealer	1.5
	Koppers Glamorglaze Wallboard Primer	1.5
	Valspar 77-W-1 PVA	1.5
	Sherwin – Williams Pro = Mar 200 Latex Primer B28	1.5
I.	Tnemec 46-413	8.0
	Koppers 300M	8.0
	Valspar 78-J-2	8.0
	Sherwin – Williams Coal Tar Epoxy C-200	8.0
J.	Tnemec Series 66-1211 Red Primer	4.0
	Koppers 654 Primer	4.0
	Valspar 13-R-56 Primer	4.0
	Sherwin – Williams Tile Clad II Epoxy Primer B62	4.0
K.	Tnemec Series 108 Ceramlon	4.0
	Koppers Glamorglaze	4.0
	Valspar 84 Series	4.0
	Sherwin - Williams Heavy Duty Epoxy B67	4.0
L.	Olympic Semi-transparent stain	
	Darworth Co. Cuprinol Semi-transparent stain	
	Sherwin - Williams Semi-Transparent Stain A14	
M.	Sika Chemical Sikagard 62 Dural Intl.	
	Duralkote 312 Corp.	
N.	W.R. Grace Co. Norn Clean Seal	

	W.R. Meadows TIAH	
O.	Tnemec Series 130 Filler	
P.	Tnemec Series 282	6.0
Q.	Tnemic Series 201 Primer Koester VAPI 2000 Primer	6.0
R.	Tnemic Series 218 Filler	6.0

* Thickness in Mils

PAINTING SCHEDULE 09200-2

SURFACES - COATING			
ITEM	1ST	2ND	3RD*
Exterior Wood and Trim (Painted)	A	B	B
Interior Wood and Trim (Painted)	A	B	B
Exterior Wood and Trim (stain) Rough Smooth	L	L	--
Interior Wood and Trim (stain) Rough Smooth	L	L	--
Interior Concrete Masonry Units	C	D	D
Chlorination Room and Chemical Storage Room – Secondary Containment Areas Existing CMU Existing Concrete New Concrete Walls New Concrete Slab and Pads	Q	P	P
Interior Concrete Walls and Ceilings (Non-submerged)	D	D	D
Exterior Concrete Masonry indicated to be painted - Above Grade	E	F	F
Interior Ferrous Metals- Doors, Pumps, Motors, Hangers, Piping	G	D	D
Valves Supports, Control Panels, Electrical Boxes, etc. (Non-submerged)	Touch-up or apply one coat if shop coat eliminated		
Interior Piping (Cast Iron)	G	D	D
Interior Piping (PVC)	D	D	--
Interior Piping (Canvas Covered)	H	D	D
Interior Non-Ferrous Metal - Aluminum, Galvanized Conduit, Etc.	G	D	D

Interior Concrete Floors Painted (w/sand added)	D	D	--
Interior Concrete Floors Sealed	N	N	--
Piping Submerged or Subject to Splash	I	I	--
Ferrous Metals Submerged	I	I	--
Ferrous Metals Subject to Splash, Structural Steel	J	D	D
Interior Drywall and Plaster	H	K	K
Exterior Ferrous Metals - Doors, Frames, Etc.	G	B	B
Non-Ferrous Metals Submerged	D	D	--
Non-Ferrous Metals	D	D	--

* Refers to manufacturer's product code in Schedule 09900-1, Painting Schedule

PAINTING SCHEDULE 09200-3

PIPING COLOR GUIDE			
Pipe and Contents	Pipe Color	Lettering	Identification
Potable Water	Dark Blue	White	Potable
Chlorination Line	Yellow	Black	Hypochlorite Solution

END OF SECTION

**SECTION 26 0500
BASIC ELECTRICAL MATERIALS AND METHODS**

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Complying with the applicable provisions of the General Conditions, Supplementary Conditions, Special State Conditions and other provisions of the Contract Documents that apply to the Work included in Division 26.
- B. The Contractor is expected to supply all tools, equipment, materials and supplies necessary to complete the services specified for a complete and operating system. Materials and supplies used will be reputable name brands and kept in excellent condition. Occupational Safety and Health Act(OSHA) training, if applicable, will be provided to all employees required to operate equipment. The Contractor will be held responsible for damages resulting from improper use of tool, materials and equipment, unless such damages result from the negligence of the School District, and shall repair or pay for such damages, at its sole cost.
- C. Install electrical systems including but not limited to: New electrical service, new telephone service, network and data infrastructure, lighting, power distribution, electrical controls, branch circuit wiring, grounding, lightning protection, life safety systems including egress and exit signs and all related electrical systems.
- D. Coordinate with local utilities and providing a new electrical service, telephone and communications service.
- E. All outages shall be coordinated with the utility companies and Owner.
- F. CONTRACTOR shall coordinate with utilities, and the Owner or any other customers affected by work. Failure to do so, and any subsequent expenses due to failure, shall be the responsibility of the CONTRACTOR.
- G. Throughout construction CONTRACTOR shall provide upgraded schedules to accurately reflect time frame of work.
- H. Complying with requirements of all codes and regulatory agencies.
- I. Arranging for and paying all fees for permits and inspections.
- J. Installing equipment furnished by others:
 - 1. Installing and connecting electrically operated equipment, cabinets, starters, controls and related items furnished under other Divisions.
 - 2. Installing conduit and wiring as required for such equipment.

1.02 WORK NOT INCLUDED

- A. Digging, backfilling, blasting, pumping, shoring, concrete and work furnished by other trades.
- B. Furnishing and/or installing temperature control for mechanical trades.
- C. Furnishing and/or installing control devices for mechanical trades unless specified herein or on the drawings.
- D. Work specifically indicated to be done by OWNER or others.

1.03 REFERENCE STANDARDS

- A. National Electrical Code NFPA 70 and Amendments.
- B. Requirements of Underwriters' Laboratories, Incorporated for all items installed for which UL standards have been established.
- C. State Building Code.
- D. Local ordinances and regulations.
- E. Utility company requirements.
- F. The Standard Specifications which are referred to herein shall be the latest revisions of such Specifications.

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1.04 QUALITY ASSURANCE

- A. Codes and standards:
 - 1. Comply with NEC requirements for electrical materials and installations. Keep copy of NEC in field office for duration of project. All work to be performed in accordance with the National Electrical Code (NEC), NFPA 70.
 - 2. Provide products and components which have been UL listed and labeled, including UL marks indicating special type usage wherever applicable.
 - 3. In each case, codes are minimum requirements.
 - 4. It shall be understood that all codes and standards mentioned shall be those in force at the time the Contract is signed. If any code is changed during the construction period, these specifications may be changed by mutual agreement between the OWNER and the CONTRACTOR.
 - 5. Work shall be in accordance with regulations and rulings of all authorities having jurisdiction over the work. Any changes required to accomplish the intent of these specifications shall be the CONTRACTOR'S responsibility as to accomplishment and any extra cost for performing work.
- B. Inspection certificates:
 - 1. Deliver to the OWNER two (2) copies of the Electrical Inspector's certificate of approval showing acceptability of work done under this Contract.
 - 2. Deliver to the OWNER two (2) copies of any other certificates of approval.

1.05 DEFINITIONS

- A. Definitions used in Section 26 0500 are not intended to change the meaning of other terms used in the Contract Documents, such as specialties, systems, structures, finishes, accessories, and similar terms. Such terms are self-explanatory and have well-recognized meanings in the construction industry.
 - 1. Products are items purchased for incorporation in the Work, whether purchased for the Project or taken from previously furnished stock. The term product includes the terms material, equipment, system, and terms of similar intent.
 - a. Named Products are items identified by manufacturer's product name, including make or model designation, indicated in the manufacturers published product literature, which is current as of the date of the Contract Documents.
 - 2. Materials are products that are substantially shaped; cut, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form a part of the Work.
 - 3. Equipment is a product with operational parts, whether motorized or manually operated, that requires service connections such as wiring or piping.
 - 4. When the term utility hole, electrical vault, electrical manhole, electrical utility vault, and electrical utility manhole are used, they may be used interchangeably.
 - 5. Installer: An "Installer" is the CONTRACTOR or another entity engaged by the CONTRACTOR, either as an employee, subcontractor, or contractor of lower tier, for performance of a particular construction activity, including installation, erection, application, and similar operations. Installers are required to be experienced in the operations they are engaged to perform.
 - 6. The term "experienced," when used with the term "Installer," means having a minimum of five previous projects similar in size and scope to this Project, being familiar with the special requirements indicated, and having complied with requirements of the authority having jurisdiction.
 - 7. Trades: Using terms such as "carpentry" is not intended to imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to tradespersons of the corresponding generic name.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Protection: Use all means necessary to protect electrical system materials before, during and after installation and to protect the installed work and materials of all other trades.

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- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the acceptance of the OWNER and at no additional cost to the OWNER. If any apparatus has been subject to possible injury by water, it shall be thoroughly dried out and put through such special tests as directed by the OWNER, at the cost and expense of the CONTRACTOR, or shall be replaced by the CONTRACTOR at his own expense.
- C. Protect the work of other trades. Restore any damage caused to other trades to the condition existing prior to damage at no additional cost to the OWNER.

1.07 PROJECT CONDITIONS

- A. Conditions:
 - 1. Prior to all work of this Section, carefully inspect the site and verify that conditions are such that this installation may properly commence.
 - 2. Verify that the electrical installation may be made in complete accordance with all pertinent codes and regulations and the original design.
 - 3. In the event of discrepancy, immediately notify the OWNER.
 - 4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.
 - 5. Coordinate the layout of the motor control center, electrical panels, control panels, time clocks, etc. and related electrical conduits so that the installation is well planned with process and HVAC equipment; this to make certain that no removal or modifications of the proposed equipment, conduits and supporting devices shown on the documents will be required.
- B. Coordination:
 - 1. Coordinate the installation of electrical items with the schedules for work of other trades to prevent unnecessary delays in the total work.
 - 2. Coordinate work with any OWNER's vendors, suppliers and CONTRACTORS.
 - 3. Coordinate with all utility companies and make all installations for their services in accordance with all utility company requirements.
 - 4. Any changes shall be done at the CONTRACTOR'S expense.
 - 5. Remove: The term "remove" means to take away, to extract, do away with and eliminate from the Project Site. All removed materials, hardware, equipment, devices, poles and related items shall be disposed of in an approved and legal manner.
 - 6. Any work installed contrary to or without approval of the OWNER shall be subject to change as directed by the OWNER, and no extra compensation will be allowed the CONTRACTOR for making these changes.
- C. Accuracy of data:
 - 1. The drawings are diagrammatic and functional only, and are not intended to show exact number of fittings, or other installation details. Furnish all labor and materials necessary to install conduit system ready for use by others. Furnish all labor and materials necessary to install and place in satisfactory operation all power, lighting, and other electrical systems shown. Install additional circuits wherever needed to conform to the specific requirements of the equipment.
 - 2. The locations of equipment, fixtures, outlets, and similar devices shown on the Drawings are approximate only. Field measurements shall take precedence over scaled dimensions from Drawings. Exact locations shall be as approved by the ARCHITECT during construction. Obtain in the field all information relevant to the placing of electrical work and, in case of any interference with other work, proceed as directed by the ARCHITECT and furnish all labor and materials necessary to complete the work in an approved manner. Verify sizes and ratings of motors and other electrically operated devices supplied by others.
 - 3. Check with ARCHITECT before installation of work for outlets not specified as to exact locations or for work that interferes with other trades.
 - 4. Verify sizes and ratings of motors and other electrically operated devices supplied by others.

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D. General:

1. Drawings and specifications are based on available information. Utility data, existing lighting circuits, conduit layouts, utility underground system locations, etc., are based on this information and may or may not reflect ultimate locations of systems. CONTRACTOR shall be responsible for verifying, prior to installation, that proposed locations for new systems are feasible. CONTRACTOR shall be responsible for all problems that are a result of not determining this feasibility, including but not limited to the installation of new electrical systems and their verification that proposed location(s) is feasible and as a result cannot be used.
2. The accompanying drawings are intended to show the general arrangement and the extent of the work. The exact location and arrangement of all parts shall be determined as the work progresses to conform in the best possible manner with the surroundings and as directed by the Owner's Representative.
3. Where work involving access to utility or owner systems is required, such as new service installations, the affected party shall be notified in a timely fashion.
4. Where existing electrical power and alarm systems including lighting and conduit are in conflict with the proposed work, the CONTRACTOR shall request through the ARCHITECT a clarification if the conflict cannot be resolved in the field.
5. Safety:
 - a. CONTRACTOR shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the work. CONTRACTOR shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:
 - 1) All employees on the work and other persons who may be affected thereby.
 - 2) All the work and all material or equipment to be incorporated there, whether in storage on or off the site.
 - 3) Other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.
 - b. CONTRACTOR shall comply with all applicable standards (specifically including OSHA, and any other state adopted OSHA program), laws, ordinances, rules, regulations and orders of any public body having jurisdiction for the safety of persons or property to protect them from damage, injury or loss; and shall erect and maintain all necessary safeguards for such safety and protection. CONTRACTOR shall notify owners of adjacent property and utilities when execution of the work may affect them.
 - c. CONTRACTOR'S duties and responsibilities for the safety and protection of the work shall continue until such time as all the work is completed.
 - d. Access Road: The CONTRACTOR shall be required to coordinate the closing of any access roads and shuttle roads that conduit system cross. Every effort shall be made to keep one lane open at all times.

1.08 INDUSTRY STANDARDS

- A. Applicability of Standards: Except where the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
- B. Publication Dates: Comply with the standards in effect as of the date of the Contract Documents.
- C. Conflicting Requirements: Where compliance with two or more standards is specified and the standards may establish different or conflicting requirements for minimum quantities or quality levels. Refer requirements that are different but apparently equal and uncertainties to the ARCHITECT for a decision before proceeding.

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1. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. In complying with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of the requirements. Refer uncertainties to the Engineer for a decision before proceeding.
- D. Copies of Standards: Each entity engaged in construction of the Project is required to be familiar with industry standards applicable to that entity's construction activity. Copies of applicable standards are not bound with the Contract Documents.
 1. Where copies of standards are needed for performance of a required construction activity, the CONTRACTOR shall obtain copies directly from the publication source.
- E. Abbreviations and Names: Trade association names and titles of general standards are frequently abbreviated. Names and addresses can be furnished to the CONTRACTOR if requested.

1.09 WARRANTY

- A. Guarantee all work performed and materials and equipment installed to the full extent required by the Drawings and Specifications to be free from inherent defects of material and workmanship for a period of one (1) year from the date of final acceptance.
- B. Replace any material and equipment prior to the final acceptance which is corroded or otherwise damaged through the mechanical contractor's failure to properly operate and maintain the installation during construction or retesting.
- C. Keep the work in repair and replace any defective materials, equipment or workmanship upon notice from the ENGINEER'S or OWNER'S representative for a period of one year from date of acceptance.
- D. Consider defective all material or equipment requiring excessive service during the first year of operation.
- E. The date of acceptance of the project appears on the ARCHITECT'S certificate of substantial completion.

1.10 INSURANCE

- A. The CONTRACTOR shall, during the life of the Contract, maintain in force such insurance as is required in the General Conditions of the Contract; and shall furnish the ENGINEER and the OWNER with certification of such insurance before beginning work on this section of the Contract.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Materials and equipment shall be listed by Underwriters' Laboratories unless it can be demonstrated that no UL standards exist for a specific item or class of equipment.
- B. All control panels, electrical equipment (motor control centers), or electrical lighting control panels whether fabricated by CONTRACTOR or furnished as part of a manufactured equipment assembly, shall be constructed to standards of and contain only products and components that have been tested and labelled by UL, ETL, FM, or other OSHA approved independent testing laboratory. All control panels shall be UL listed as a complete assembly or be a UL Field Evaluated Product. The CONTRACTOR shall bear all costs related to the UL field evaluation, panel modifications and follow-up evaluations. Control panels failing to meet UL listing standards shall be removed and replaced by listed panels at no cost to the OWNER.
- C. All other materials, not specifically described but required for a complete and operable electrical installation, shall be new, first quality of their respective kinds, specification grade or better, and as selected by the CONTRACTOR subject to the approval of the ARCHITECT.

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2.02 INTERCHANGEABILITY

- A. In all design and purchasing, interchangeability of items of equipment, subassemblies, parts, motors, starters, relays and other items is essential. All similar items shall be of the same manufacturer, type, model and dimensions.
- B. For ease of maintenance and parts replacement, to the maximum extent possible, use equipment of a single manufacturer.
- C. The ENGINEER reserves the right to reject any submittal which contains equipment from various manufacturers if suitable materials can be secured from fewer manufacturers and to require that source of materials be unified to the maximum extent possible.

2.03 ACCESSIBILITY

- A. Verify the sufficiency and the size of shafts and chases, and adequate clearance in double partitions and hung ceilings for the proper installation of the work. Coordinate and cooperate with all other trades whose work is within the same space.
- B. Locate all equipment which must be serviced, operated, or maintained in full accessible positions. Equipment shall include but not be limited to motors, controllers, switchgear and panels.

2.04 CONNECTIONS TO EQUIPMENT AND FIXTURES

- A. Rough-in and make final electrical connections to all equipment furnished under other sections. Connections shall include necessary disconnect switches, etc. CONTRACTOR shall obtain approved rough-in drawings for equipment before starting work. Rough-in work done without approved drawings shall be relocated at CONTRACTOR'S expense.

2.05 PAINTING AND CLEANING

- A. Painting shall be under other Sections except as stated below and shall be directed by the ENGINEER..
- B. All exposed to view metal surfaces (conduit, conduit hangers, hangers, supports, etc.) exposed to view in finished indoor areas except for exposed items in boiler/mechanical/electrical rooms shall be given two (2) coats of an approved paint by the installing CONTRACTOR per manufacturer's instructions. Metal surfaces (conduit, conduit hangers, hangers, supports, etc.) exposed outdoors shall be given two (2) coats of an approved rust inhibiting paint by the installing CONTRACTOR per manufacturer's instructions. This shall apply to the ends of metal framing (i.e., slot tubing and supports) and those hangers that are galvanized and have been cut or have the galvanizing removed or damaged.
- C. Paint finish and color shall be coordinated with the ENGINEER and approved by such.
- D. Conduit, steel, hardware and bolts, etc. installed in earth or below vapor barrier shall be given two (2) coats of protective approved paint. This applies to all electrical steel products. Material embedded in concrete need not be painted. Conduit protruding through concrete floors shall be plastic or bitumastic coated at the point of breach in a neat and workman like manner.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install all equipment and fixtures in complete accordance with the manufacturer's recommendations and all pertinent codes and regulations.
- B. Thoroughly inspect all items of equipment and any items dented, scratched or otherwise damaged in any manner shall be replaced or repaired and painted to match original finish.
 - 1. All items so repaired and refinished shall be brought to the attention of the ARCHITECT for inspection and approval.
- C. Upon completion of all installation, lamping, and testing, thoroughly inspect all exposed portions of the electrical installation and completely remove all exposed labels, soil, markings and foreign material.

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3.02 CUTTING AND PATCHING

- A. All cutting and patching shall be as described under other Sections.

3.03 FLOOR AND WALL PENETRATIONS

- A. Provide, locate and set all sleeves and inserts as required for this work with the CONTRACTOR and the precast concrete supplier. Prepare dimensioned floor and wall penetration drawings, showing the size and location of each penetration on every floor and in every wall which is to accommodate this work. The penetration drawings shall include, but not be limited to hangers, inserts, conduits, raceways, and curbs. This requirement shall be provided for all the precast concrete items as well including the precast tees.
 - 1. Drawings shall be submitted to the ARCHITECT in advance of the work to be done in order that adjustments may be made to the reinforcing steel, structural framing and other related work without interruption to the construction schedule. All sleeves, collars, hangers, inserts, etc. shall be installed in accordance with the penetration drawings prior to constructing floors and walls. Each CONTRACTOR shall be responsible for any drilling and as approved by the ENGINEER.
- B. Should the penetration drawings be incomplete the CONTRACTOR shall bear the full cost of all work for the cutting and patching required making the correction.
- C. Where sleeves are placed in exterior walls below grade, the space between the conduit and the sleeve shall be packed with "Link-Seal" and made completely watertight.
- D. Where conduit motion due to expansion and contraction will occur, make sleeves of sufficient diameter to permit free movement. Check floor and wall construction finish to determine proper length of sleeves for various locations, make actual length to suit the following:
 - 1. Terminate sleeves flush with walls, partitions, and ceiling.
 - 2. In areas where conduit is concealed, as in chases, terminate sleeves flush with floor.
 - 3. In all areas where conduit is exposed, extend sleeves 1/4" above finished floor, except in rooms having floor drains, where sleeves shall be extended 2" above floor.
- E. Sleeves shall be constructed of 24-gauge galvanized sheet steel with lock seam joints for all sleeves set in concrete floor slabs terminating flush with the floor. All other sleeves shall be constructed of galvanized steel pipe.
- F. Fasten sleeves securely in floors, walls, etc. so that they will not become displaced when concrete is poured or when other construction is built around them. Take precautions to prevent concrete, plaster, or other materials being forced into the space between pipe and sleeve during construction.
- G. Where conduits pass through floors or rated walls, the openings around the conduits shall be sealed with 3M fire sealing compound or approved equal. Conduit floor penetrations within rated chases shall be sealed with smoke barrier sealants. The 3M type sealant used shall be approved by the local authorities having jurisdiction and carry U.L. listing for rating of assembly.
- H. All conduits and related branch circuits in any exterior locations in the facility shall be sealed watertight to prevent water and condensation from entering the lighting fixtures, boxes, receptacles and related devices.

3.04 ELECTRICAL CONNECTIONS TO EQUIPMENT AND SYSTEMS

- A. Equipment wiring shall be as follows:
 - 1. All wiring shall be provided under Division 26 except the following which shall be provided under Division 23 and Division 40: All associated mechanical systems control wiring for equipment described under Division 23 and other control wiring required to be provided by Division 23 & 40.
 - 2. All starters for HVAC systems not factory mounted on equipment shall be furnished under Division 26 and installed under Division 26. Heating elements for starters shall be provided under Division 26 and installed under Division 26.
 - 3. All control items connected shall be marked plainly by painted letters or approved nameplate on the equipment that is controlled, to the approval of the ENGINEER.

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4. The horsepower rating of all starters shall be checked against actual motor to be controlled, before installation, and correct size overload elements shall be provided in all starters based on nameplate and manufacturer's recommendation.
5. After all circuits are energized and completed, the power wiring responsibility shall be under the Division 26 and control wiring responsibility under the Division 23 & 40. Motors and controllers shall be provided for voltage and current characteristics as indicated in 23 & 40 Division providing the equipment. In the event that equipment provided is of different electrical characteristics than the ones specified, any increase in electrical feeders, conduits, circuit breakers, etc., including increase of labor cost shall be the responsibility of the Division which provided the equipment of different characteristics than those specified.
6. All power wiring complete from power source to motor or equipment junction box, including power wiring through starters shall be furnished and installed under Division 26.
7. General Clearance Requirements: Provide clearance spaces between and around process, mechanical and electrical equipment for operation, maintenance and replacement of equipment. Minimum clearances for each item or piece of equipment shall be as stated in the manufacturer's printed recommendations or as shown on the manufacturer's printed drawings. Coordinate clearance requirements among various pieces of equipment that will be installed in close proximity with one another to eliminate equipment conflicts and interference. NEC Code clearances shall be maintained at all times and shall be considered the minimum clearances allowed.
8. After all circuits are energized and completed, the power wiring responsibility shall be under the Division 26 and control wiring responsibility under the Division 23. Motors and controllers shall be provided for voltage and current characteristics as indicated in Division providing the equipment. In the event that equipment provided is of different electrical characteristics than the ones specified, any increase in electrical feeders, conduits, circuit breakers, etc., including increase of labor cost shall be the responsibility of the Division which provided the equipment of different characteristics than those specified
9. Interiors of all conduits to be swabbed clean and dry before pulling wire. Interiors of enclosures to be cleaned of dirt and debris before installing trim or cover. Finished surfaces of equipment furnished and installed to be thoroughly cleaned of dirt. Scratches or damaged surfaces shall be properly repaired and painted to match existing.
10. Equipment Requirements: Provide code clearances between and around process, mechanical and electrical equipment for operation, maintenance and replacement of equipment. Prepare and submit shop drawings if requested by the ARCHITECT showing proposed equipment layouts and clearances.
 - a. NEC Code clearances shall be maintained at all times and shall be considered the minimum clearances allowed.
 - b. Life safety equipment and wiring including related to emergency lighting fixtures and exit signs also fire alarm system shall be separately wired from normal branch circuit wiring related to general lighting and power circuits in full conformance with the NEC.

3.05 OPERATIONS AND MAINTENANCE MANUALS

- A. The Contractor shall furnish six (6) sets of operation and maintenance manuals to the Owner's Representative. These manuals shall include all items designated in the specifications, shall be assembled in an indexed three-ring binder as described in the paragraph titled "SUBMITTALS" and shall include all warranties. Provide 3 each CD's with complete information as contained in the manual. Separate equipment brochures will not be acceptable. A pictorial parts list, operation and maintenance instructions, system descriptions, schematic wiring diagrams and equipment cut sheets shall be included for each item with source information. NOTE: These manuals shall be delivered to the Owner's Representative prior to final acceptance of the installation by the Owner.
- B. Final acceptance of the installation shall not occur until the Owner's personnel have been trained in the maintenance and operation of all equipment for a minimum of sixteen (16) hours.

END OF SECTION 26 0500

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**SECTION 26 0505
SELECTIVE DEMOLITION FOR ELECTRICAL**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electrical demolition.

1.02 RELATED REQUIREMENTS

- A. Section 01 7000 - Execution and Closeout Requirements: Additional requirements for alterations work.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Sustainable Design Documentation: Submit certification of removal and appropriate disposal of abandoned cables containing lead stabilizers.

PART 2 PRODUCTS

2.01 MATERIALS AND EQUIPMENT

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

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify field measurements and circuiting arrangements are as indicated.
- B. Verify that abandoned wiring and equipment serve only abandoned facilities.
- C. Demolition drawings are based on casual field observation and existing record documents.
- D. Report discrepancies to Owner before disturbing existing installation.
- E. Report discrepancies to Architect before disturbing existing installation.
- F. Beginning of demolition means installer accepts existing conditions.

3.02 PREPARATION

- A. Disconnect electrical systems in walls, floors, and ceilings to be removed.
- B. Coordinate utility service outages with utility company.
- C. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations.
- D. Existing Electrical Service: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switchovers and connections. Minimize outage duration.
 - 1. test
 - 2. Make temporary connections to maintain service in areas adjacent to work area.
- E. Existing Fire Alarm System: Maintain existing system in service until new system is accepted. Disable system only to make switchovers and connections. Minimize outage duration.
 - 1. Notify Owner before partially or completely disabling system.
 - 2. Notify local fire service.
 - 3. Make notifications at least 24 hours in advance.
 - 4. Make temporary connections to maintain service in areas adjacent to work area.
- F. Existing distribution System: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switchovers and connections. Minimize outage duration.
 - 1. Obtain permission from Owner at least 24 hours before partially or completely disabling system.
 - 2. Make temporary connections to maintain service in areas adjacent to work area.

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3.03 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

- A. Remove, relocate, and extend existing installations to accommodate new construction.
- B. Remove abandoned wiring to source of supply.
- C. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.
- D. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets that are not removed.
- E. Disconnect and remove abandoned panelboards and distribution equipment.
- F. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.
- G. Disconnect and remove abandoned luminaires. Remove brackets, stems, hangers, and other accessories.
- H. Repair adjacent construction and finishes damaged during demolition and extension work.
- I. Maintain access to existing electrical installations that remain active. Modify installation or provide access panel as appropriate.
- J. Extend existing installations using materials and methods compatible with existing electrical installations, or as specified.

3.04 CLEANING AND REPAIR

- A. See Section 01 7419 - Construction Waste Management and Disposal for additional requirements.
- B. Clean and repair existing materials and equipment that remain or that are to be reused.
- C. Panelboards: Clean exposed surfaces and check tightness of electrical connections. Replace damaged circuit breakers and provide closure plates for vacant positions. Provide typed circuit directory showing revised circuiting arrangement.
- D. Luminaires: Remove existing luminaires for cleaning. Use mild detergent to clean all exterior and interior surfaces; rinse with clean water and wipe dry. Replace lamps, ballasts and broken electrical parts.

END OF SECTION 26 0505

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**SECTION 26 0519
LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Single conductor building wire.
- B. Metal-clad cable.
- C. Wiring connectors.
- D. Electrical tape.
- E. Heat shrink tubing.
- F. Oxide inhibiting compound.
- G. Wire pulling lubricant.
- H. Cable ties.

1.02 RELATED REQUIREMENTS

- A. Section 26 0505 - Selective Demolition for Electrical: Disconnection, removal, and/or extension of existing electrical conductors and cables.
- B. Section 26 0526 - Grounding and Bonding for Electrical Systems: Additional requirements for grounding conductors and grounding connectors.
- C. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- D. Section 26 2100 - Low-Voltage Electrical Service Entrance: Additional requirements for electrical service conductors.
- E. Section 28 4600 - Fire Detection and Alarm: Fire alarm system conductors and cables.

1.03 REFERENCE STANDARDS

- A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire; 2013.
- B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft; 2011.
- C. ASTM B787/B787M - Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation; 2004 (Reapproved 2014).
- D. ASTM D3005 - Standard Specification for Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape; 2010.
- E. ASTM D4388 - Standard Specification for Nonmetallic Semi-Conducting and Electrically Insulating Rubber Tapes; 2013.
- F. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- G. NECA 104 - Recommended Practice for Installing Aluminum Building Wire and Cable; 2012.
- H. NEMA WC 70 - Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy; 2009.
- I. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2013.
- J. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- K. UL 44 - Thermoset-Insulated Wires and Cables; Current Edition, Including All Revisions.
- L. UL 83 - Thermoplastic-Insulated Wires and Cables; Current Edition, Including All Revisions.
- M. UL 486A-486B - Wire Connectors; Current Edition, Including All Revisions.
- N. UL 486C - Splicing Wire Connectors; Current Edition, Including All Revisions.

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- O. UL 486D - Sealed Wire Connector Systems; Current Edition, Including All Revisions.
- P. UL 510 - Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape; Current Edition, Including All Revisions.
- Q. UL 1277 - Electrical Power and Control Tray Cables with Optional Optical-Fiber Members; Current Edition, Including All Revisions.
- R. UL 1569 - Metal-Clad Cables; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate sizes of raceways, boxes, and equipment enclosures installed under other sections with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
 - 2. Coordinate with electrical equipment installed under other sections to provide terminations suitable for use with the conductors to be installed.
 - 3. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for conductors and cables, including detailed information on materials, construction, ratings, listings, and available sizes, configurations, and stranding.
- C. Field Quality Control Test Reports.
- D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- E. Project Record Documents: Record actual installed circuiting arrangements. Record actual routing for underground circuits.

1.06 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

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

1.08 FIELD CONDITIONS

- A. Do not install or otherwise handle thermoplastic-insulated conductors at temperatures lower than 14 degrees F (-10 degrees C), unless otherwise permitted by manufacturer's instructions. When installation below this temperature is unavoidable, notify Architect and obtain direction before proceeding with work.

PART 2 PRODUCTS

2.01 CONDUCTOR AND CABLE APPLICATIONS

- A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.
- B. Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted, or required.
- C. Nonmetallic-sheathed cable is not permitted.
- D. Metal-clad cable is permitted only as follows:

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1. Where not otherwise restricted, may be used:
 - a. Where concealed above accessible ceilings for final connections from junction boxes to luminaires.
 - 1) Maximum Length: 6 feet (1.8 m).
 - b. Where concealed in hollow stud walls, above accessible ceilings, and under raised floors for branch circuits up to 20 A.
2. In addition to other applicable restrictions, may not be used:
 - a. Unless approved by Owner.
 - b. Where not approved for use by the authority having jurisdiction.
 - c. Where exposed to view.
 - d. Where exposed to damage.
 - e. For damp, wet, or corrosive locations, unless provided with a PVC jacket listed as suitable for those locations.

2.02 CONDUCTOR AND CABLE GENERAL REQUIREMENTS

- A. Provide products that comply with requirements of NFPA 70.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.
- D. Comply with NEMA WC 70.
- E. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.
- F. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.
- G. Conductors for Grounding and Bonding: Also comply with Section 26 0526.
- H. Conductor Material:
 1. Provide copper conductors except where aluminum conductors are specifically indicated. Substitution of aluminum conductors for copper is not permitted. Conductor sizes indicated are based on copper unless specifically indicated as aluminum. Conductors designated with the abbreviation "AL" indicate aluminum.
 2. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B787M unless otherwise indicated.
 3. Tinned Copper Conductors: Comply with ASTM B33.
 4. Aluminum Conductors (only where specifically indicated or permitted for substitution): AA-8000 series aluminum alloy conductors recognized by ASTM B800 and compact stranded in accordance with ASTM B801 unless otherwise indicated.
- I. Minimum Power Conductor Size: 12 AWG.
 1. Branch Circuits: 12 AWG.
 - a. Exceptions:
 - 1) 20 A, 120 V circuits longer than 75 feet (23 m): 10 AWG, for voltage drop.
 - 2) 20 A, 120 V circuits longer than 150 feet (46 m): 8 AWG, for voltage drop.
 - 3) 20 A, 277 V circuits longer than 150 feet (46 m): 10 AWG, for voltage drop.
 2. Control Circuits Power: 14 AWG.
- J. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
- K. Conductor Color Coding:
 1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
 2. Color Coding Method: Integrally colored insulation.
 - a. Conductors size 4 AWG and larger may have black insulation color coded using vinyl color coding electrical tape.
 3. Color Code:
 - a. 480Y/277 V, 3 Phase, 4 Wire System:

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- 1) Phase A: Brown.
- 2) Phase B: Orange.
- 3) Phase C: Yellow.
- 4) Neutral/Grounded: Gray.
- b. 240/120 V or 208/120V, 1 Phase, 3 Wire System:
 - 1) Phase A: Black.
 - 2) Phase B: Red.
 - 3) Neutral/Grounded: White.
- c. Equipment Ground, All Systems: Green.
- d. For modifications or additions to existing wiring systems, comply with existing color code when existing code complies with NFPA 70 and is approved by the authority having jurisdiction.
- e. For control circuits, comply with manufacturer's recommended color code.

2.03 SINGLE CONDUCTOR BUILDING WIRE

- A. Manufacturers:
 - 1. Copper Building Wire:
 - a. Cerro Wire LLC: www.cerrowire.com/#sle.
 - b. Encore Wire Corporation: www.encorewire.com/#sle.
 - c. General Cable Technologies Corporation: www.generalcable.com/#sle.
 - d. Southwire Company: www.southwire.com/#sle.
 - e. Substitutions: See Section 01 6000 - Product Requirements.
 - 2. Aluminum Building Wire (only where specifically indicated or permitted for substitution):
 - a. Encore Wire Corporation: www.encorewire.com/#sle.
 - b. Southwire Company: www.southwire.com/#sle.
 - c. Stabiloy, a brand of General Cable Technologies Corporation: www.stabiloy.com/#sle.
 - d. Substitutions: See Section 01 6000 - Product Requirements.
- B. Description: Single conductor insulated wire.
- C. Conductor Stranding:
 - 1. Feeders and Branch Circuits:
 - a. Size 10 AWG and Smaller: Solid.
 - b. Size 8 AWG and Larger: Stranded.
- D. Insulation Voltage Rating: 600 V.
- E. Insulation:
 - 1. Copper Building Wire: Type THHN/THWN or THHN/THWN-2, except as indicated below.
 - a. Size 4 AWG and Larger: Type XHHW-2.
 - b. Installed Underground: Type XHHW-2.
 - 2. Aluminum Building Wire (only where specifically indicated or permitted for substitution): Type XHHW-2.

2.04 METAL-CLAD CABLE

- A. Manufacturers:
 - 1. AFC Cable Systems Inc: www.afcweb.com/#sle.
 - 2. Encore Wire Corporation: www.encorewire.com/#sle.
 - 3. Southwire Company: www.southwire.com/#sle.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Description: NFPA 70, Type MC cable listed and labeled as complying with UL 1569, and listed for use in classified firestop systems to be used.
- C. Conductor Stranding:
 - 1. Size 10 AWG and Smaller: Solid.
 - 2. Size 8 AWG and Larger: Stranded.
- D. Insulation Voltage Rating: 600 V.

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- E. Insulation: Type THHN, THHN/THWN, or THHN/THWN-2.
- F. Grounding: Full-size integral equipment grounding conductor.
- G. Armor: Steel, interlocked tape.
- H. Provide PVC jacket applied over cable armor where indicated or required for environment of installed location.

2.05 WIRING CONNECTORS

- A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.
- B. Connectors for Grounding and Bonding: Comply with Section 26 0526.
- C. Wiring Connectors for Splices and Taps:
 - 1. Copper Conductors Size 8 AWG and Smaller: Use twist-on insulated spring connectors.
 - 2. Copper Conductors Size 6 AWG and Larger: Use mechanical connectors or compression connectors.
- D. Wiring Connectors for Terminations:
 - 1. Provide terminal lugs for connecting conductors to equipment furnished with terminations designed for terminal lugs.
 - 2. Provide compression adapters for connecting conductors to equipment furnished with mechanical lugs when only compression connectors are specified.
 - 3. Where over-sized conductors are larger than the equipment terminations can accommodate, provide connectors suitable for reducing to appropriate size, but not less than required for the rating of the overcurrent protective device.
 - 4. Provide motor pigtail connectors for connecting motor leads in order to facilitate disconnection.
 - 5. Copper Conductors Size 8 AWG and Larger: Use mechanical connectors or compression connectors where connectors are required.
 - 6. Aluminum Conductors: Use compression connectors for all connections.
 - 7. Stranded Conductors Size 10 AWG and Smaller: Use crimped terminals for connections to terminal screws.
 - 8. Conductors for Control Circuits: Use crimped terminals for all connections.
- E. Twist-on Insulated Spring Connectors: Rated 600 V, 221 degrees F (105 degrees C) for standard applications and 302 degrees F (150 degrees C) for high temperature applications; pre-filled with sealant and listed as complying with UL 486D for damp and wet locations.
- F. Mechanical Connectors: Provide bolted type or set-screw type.
- G. Compression Connectors: Provide circumferential type or hex type crimp configuration.
- H. Crimped Terminals: Nylon-insulated, with insulation grip and terminal configuration suitable for connection to be made.

2.06 WIRING ACCESSORIES

- A. Electrical Tape:
 - 1. Manufacturers:
 - a. 3M: www.3m.com/#sle.
 - b. Plymouth Rubber Europa: www.plymouthrubber.com/#sle.
 - 2. Vinyl Color Coding Electrical Tape: Integrally colored to match color code indicated; listed as complying with UL 510; minimum thickness of 7 mil (0.18 mm); resistant to abrasion, corrosion, and sunlight; suitable for continuous temperature environment up to 221 degrees F (105 degrees C).
 - 3. Vinyl Insulating Electrical Tape: Complying with ASTM D3005 and listed as complying with UL 510; minimum thickness of 7 mil (0.18 mm); resistant to abrasion, corrosion, and sunlight; conformable for application down to 0 degrees F (-18 degrees C) and suitable for continuous temperature environment up to 221 degrees F (105 degrees C).

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4. Rubber Splicing Electrical Tape: Ethylene Propylene Rubber (EPR) tape, complying with ASTM D4388; minimum thickness of 30 mil (0.76 mm); suitable for continuous temperature environment up to 194 degrees F (90 degrees C) and short-term 266 degrees F (130 degrees C) overload service.
 5. Electrical Filler Tape: Rubber-based insulating moldable putty, minimum thickness of 125 mil (3.2 mm); suitable for continuous temperature environment up to 176 degrees F (80 degrees C).
 6. Moisture Sealing Electrical Tape: Insulating mastic compound laminated to flexible, all-weather vinyl backing; minimum thickness of 90 mil (2.3 mm).
- B. Heat Shrink Tubing: Heavy-wall, split-resistant, with factory-applied adhesive; rated 600 V; suitable for direct burial applications; listed as complying with UL 486D.
 - C. Oxide Inhibiting Compound: Listed; suitable for use with the conductors or cables to be installed.
 - D. Wire Pulling Lubricant: Listed; suitable for use with the conductors or cables to be installed and suitable for use at the installation temperature.
 - E. Cable Ties: Material and tensile strength rating suitable for application.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that interior of building has been protected from weather.
- B. Verify that work likely to damage wire and cable has been completed.
- C. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.
- D. Verify that field measurements are as indicated.
- E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

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

3.03 INSTALLATION

- A. Circuiting Requirements:
 1. Unless dimensioned, circuit routing indicated is diagrammatic.
 2. When circuit destination is indicated without specific routing, determine exact routing required.
 3. Arrange circuiting to minimize splices.
 4. Include circuit lengths required to install connected devices within 10 ft (3.0 m) of location indicated.
 5. Maintain separation of Class 1, Class 2, and Class 3 remote-control, signaling, and power-limited circuits in accordance with NFPA 70.
 6. Maintain separation of wiring for emergency systems in accordance with NFPA 70.
 7. Circuiting Adjustments: Unless otherwise indicated, when branch circuits are indicated as separate, combining them together in a single raceway is not permitted.
 - a. Increase size of conductors as required to account for ampacity derating.
 - b. Size raceways, boxes, etc. to accommodate conductors.
 8. Common Neutrals: Unless otherwise indicated, sharing of neutral/grounded conductors among up to three single phase branch circuits of different phases installed in the same raceway is not permitted. Provide dedicated neutral/grounded conductor for each individual branch circuit.
- B. Install products in accordance with manufacturer's instructions.
- C. Perform work in accordance with NECA 1 (general workmanship).
- D. Install aluminum conductors in accordance with NECA 104.

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- E. Install metal-clad cable (Type MC) in accordance with NECA 120.
- F. Installation in Raceway:
 - 1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.
 - 2. Pull all conductors and cables together into raceway at same time.
 - 3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.
 - 4. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.
- G. Paralleled Conductors: Install conductors of the same length and terminate in the same manner.
- H. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.
 - 1. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conductors and cables to lay on ceiling tiles.
- I. Terminate cables using suitable fittings.
 - 1. Metal-Clad Cable (Type MC):
 - a. Use listed fittings.
 - b. Cut cable armor only using specialized tools to prevent damaging conductors or insulation. Do not use hacksaw or wire cutters to cut armor.
- J. Install conductors with a minimum of 12 inches (300 mm) of slack at each outlet.
- K. Where conductors are installed in enclosures for future termination by others, provide a minimum of 5 feet (1.5 m) of slack.
- L. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.
- M. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.
- N. Make wiring connections using specified wiring connectors.
 - 1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.
 - 2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.
 - 3. Do not remove conductor strands to facilitate insertion into connector.
 - 4. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminates. Do not use wire brush on plated connector surfaces.
 - 5. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
 - 6. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.
- O. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.
 - 1. Dry Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.
 - a. For taped connections, first apply adequate amount of rubber splicing electrical tape or electrical filler tape, followed by outer covering of vinyl insulating electrical tape.
 - 2. Damp Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.

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- a. For connections with insulating covers, apply outer covering of moisture sealing electrical tape.
 - b. For taped connections, follow same procedure as for dry locations but apply outer covering of moisture sealing electrical tape.
3. Wet Locations: Use heat shrink tubing.
- P. Insulate ends of spare conductors using vinyl insulating electrical tape.
 - Q. Field-Applied Color Coding: Where vinyl color coding electrical tape is used in lieu of integrally colored insulation as permitted in Part 2 under "Color Coding", apply half overlapping turns of tape at each termination and at each location conductors are accessible.
 - R. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 8400.
 - S. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Perform inspections and tests listed in NETA ATS, Section 7.3.2. The insulation resistance test is required for all conductors. The resistance test for parallel conductors listed as optional is not required.
 - 1. Disconnect surge protective devices (SPDs) prior to performing any high potential testing. Replace SPDs damaged by performing high potential testing with SPDs connected.
- D. Correct deficiencies and replace damaged or defective conductors and cables.

END OF SECTION 26 0519

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**SECTION 26 0526
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS**

PART 1 GENERAL

1.01 SECTION INCLUDES

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

1.02 RELATED REQUIREMENTS

- A. Section 26 0519 - Low-Voltage Electrical Power Conductors and Cables: Additional requirements for conductors for grounding and bonding, including conductor color coding.
- B. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

- A. IEEE 81 - IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System; 2012.
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- C. NEMA GR 1 - Grounding Rod Electrodes and Grounding Rod Electrode Couplings; 2017.
- D. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2013.
- E. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. UL 467 - Grounding and Bonding Equipment; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the work with other trades to provide steel reinforcement complying with specified requirements for concrete-encased electrode.
 - 2. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Sequencing:
 - 1. Do not install ground rod electrodes until final backfill and compaction is complete.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittals procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for grounding and bonding system components.
- C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- D. Field quality control test reports.
- E. Project Record Documents: Record actual locations of grounding electrode system components and connections.

1.06 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.

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- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

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

PART 2 PRODUCTS

2.01 GROUNDING AND BONDING REQUIREMENTS

- A. Existing Work: Where existing grounding and bonding system components are indicated to be reused, they may be reused only where they are free from corrosion, integrity and continuity are verified, and where acceptable to the authority having jurisdiction.
- B. Do not use products for applications other than as permitted by NFPA 70 and product listing.
- C. Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.
- D. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
- E. Grounding System Resistance:
 - 1. Achieve specified grounding system resistance under normally dry conditions unless otherwise approved by Architect. Precipitation within the previous 48 hours does not constitute normally dry conditions.
 - 2. Grounding Electrode System: Not greater than 5 ohms to ground, when tested according to IEEE 81 using "fall-of-potential" method.
- F. Grounding Electrode System:
 - 1. Provide connection to required and supplemental grounding electrodes indicated to form grounding electrode system.
 - a. Provide continuous grounding electrode conductors without splice or joint.
 - b. Install grounding electrode conductors in raceway where exposed to physical damage. Bond grounding electrode conductor to metallic raceways at each end with bonding jumper.
 - 2. Metal In-Ground Support Structure:
 - a. Provide connection to metal in-ground support structure that is in direct contact with earth in accordance with NFPA 70.
 - 3. Concrete-Encased Electrode:
 - a. Provide connection to concrete-encased electrode consisting of not less than 20 feet (6.0 m) of either steel reinforcing bars or bare copper conductor not smaller than 4 AWG embedded within concrete foundation or footing that is in direct contact with earth in accordance with NFPA 70.
 - 4. Ground Rod Electrode(s):
 - a. Provide three electrodes in an equilateral triangle configuration unless otherwise indicated or required.
 - b. Space electrodes not less than 10 feet (3.0 m) from each other and any other ground electrode.
 - c. Where location is not indicated, locate electrode(s) at least 5 feet (1.5 m) outside building perimeter foundation as near as possible to electrical service entrance; where possible, locate in softscape (uncovered) area.
 - 5. Provide additional ground electrode(s) as required to achieve specified grounding electrode system resistance.

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6. Ground Bar: Provide ground bar, separate from service equipment enclosure, for common connection point of grounding electrode system bonding jumpers as permitted in NFPA 70. Connect grounding electrode conductor provided for service-supplied system grounding to this ground bar.
 - a. Ground Bar Size: 1/4 by 2 by 12 inches (6 by 50 by 300 mm) unless otherwise indicated or required.
 - b. Where ground bar location is not indicated, locate in accessible location as near as possible to service disconnect enclosure.
 - c. Ground Bar Mounting Height: 18 inches (450 mm) above finished floor unless otherwise indicated.
- G. Service-Supplied System Grounding:
 1. For each service disconnect, provide grounding electrode conductor to connect neutral (grounded) service conductor to grounding electrode system. Unless otherwise indicated, make connection at neutral (grounded) bus in service disconnect enclosure.
 2. For each service disconnect, provide main bonding jumper to connect neutral (grounded) bus to equipment ground bus where not factory-installed. Do not make any other connections between neutral (grounded) conductors and ground on load side of service disconnect.
- H. Grounding for Separate Building or Structure Supplied by Feeder(s) or Branch Circuits:
 1. Provide grounding electrode system for each separate building or structure.
 2. Provide equipment grounding conductor routed with supply conductors.
 3. For each disconnecting means, provide grounding electrode conductor to connect equipment ground bus to grounding electrode system.
 4. Do not make any connections and remove any factory-installed jumpers between neutral (grounded) conductors and ground.
- I. Separately Derived System Grounding:
 1. Separately derived systems include, but are not limited to:
 - a. Transformers (except autotransformers such as buck-boost transformers).
 - b. Uninterruptible power supplies (UPS), when configured as separately derived systems.
 - c. Generators, when neutral is switched in the transfer switch.
 2. Provide grounding electrode conductor to connect derived system grounded conductor to nearest effectively grounded metal building frame. Unless otherwise indicated, make connection at neutral (grounded) bus in source enclosure.
 3. Provide bonding jumper to connect derived system grounded conductor to nearest metal building frame and nearest metal water piping in the area served by the derived system, where not already used as a grounding electrode for the derived system. Make connection at same location as grounding electrode conductor connection.
 4. Where common grounding electrode conductor ground riser is used for tap connections to multiple separately derived systems, provide bonding jumper to connect the metal building frame and metal water piping in the area served by the derived system to the common grounding electrode conductor.
 5. Outdoor Source: Where the source of the separately derived system is located outside the building or structure supplied, provide connection to grounding electrode at source in accordance with NFPA 70.
 6. Provide system bonding jumper to connect system grounded conductor to equipment ground bus. Make connection at same location as grounding electrode conductor connection. Do not make any other connections between neutral (grounded) conductors and ground on load side of separately derived system disconnect.
 7. Where the source and first disconnecting means are in separate enclosures, provide supply-side bonding jumper between source and first disconnecting means.
- J. Bonding and Equipment Grounding:

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1. Provide bonding for equipment grounding conductors, equipment ground busses, metallic equipment enclosures, metallic raceways and boxes, device grounding terminals, and other normally non-current-carrying conductive materials enclosing electrical conductors/equipment or likely to become energized as indicated and in accordance with NFPA 70.
 2. Provide insulated equipment grounding conductor in each feeder and branch circuit raceway. Do not use raceways as sole equipment grounding conductor.
 3. Where circuit conductor sizes are increased for voltage drop, increase size of equipment grounding conductor proportionally in accordance with NFPA 70.
 4. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
 5. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on neutral (grounded) or isolated/insulated ground bus.
 6. Provide bonding jumper across expansion or expansion/deflection fittings provided to accommodate conduit movement.
 7. Provide bonding for interior metal piping systems in accordance with NFPA 70. This includes, but is not limited to:
 - a. Metal water piping where not already effectively bonded to metal underground water pipe used as grounding electrode.
 - b. Metal process piping.
 8. Provide bonding for interior metal air ducts.
 9. Provide bonding for metal building frame.
 10. Provide bonding for metal siding not effectively bonded through attachment to metal building frame.
- K. Communications Systems Grounding and Bonding:
1. Provide intersystem bonding termination at service equipment or metering equipment enclosure and at disconnecting means for any additional buildings or structures in accordance with NFPA 70.
 2. Provide bonding jumper in raceway from intersystem bonding termination to each communications room or backboard and provide ground bar for termination.
 - a. Bonding Jumper Size: 6 AWG, unless otherwise indicated or required.
 - b. Raceway Size: 3/4 inch (21 mm) trade size unless otherwise indicated or required.
 - c. Ground Bar Size: 1/4 by 2 by 12 inches (6 by 50 by 300 mm) unless otherwise indicated or required.
 - d. Ground Bar Mounting Height: 18 inches (450 mm) above finished floor unless otherwise indicated.

2.02 GROUNDING AND BONDING COMPONENTS

- A. General Requirements:
1. Provide products listed, classified, and labeled as suitable for the purpose intended.
 2. Provide products listed and labeled as complying with UL 467 where applicable.
- B. Conductors for Grounding and Bonding, in Addition to Requirements of Section 26 0526:
1. Use insulated copper conductors unless otherwise indicated.
 - a. Exceptions:
 - 1) Use bare copper conductors where installed underground in direct contact with earth.
 - 2) Use bare copper conductors where directly encased in concrete (not in raceway).
- C. Connectors for Grounding and Bonding:
1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.
 2. Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.
 3. Manufacturers - Mechanical and Compression Connectors:

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- a. Thomas & Betts Corporation: www.tnb.com/#sle.
 - b. Substitutions: See Section 01 6000 - Product Requirements.
- D. Ground Bars:
- 1. Description: Copper rectangular ground bars with mounting brackets and insulators.
 - 2. Size: As indicated.
 - 3. Holes for Connections: As indicated or as required for connections to be made.
- E. Ground Rod Electrodes:
- 1. Comply with NEMA GR 1.
 - 2. Material: Copper-bonded (copper-clad) steel.
 - 3. Size: 3/4 inch (19 mm) diameter by 10 feet (3.0 m) length, unless otherwise indicated.

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Ground Rod Electrodes: Unless otherwise indicated, install ground rod electrodes vertically. Where encountered rock prohibits vertical installation, install at 45 degree angle or bury horizontally in trench at least 30 inches (750 mm) deep in accordance with NFPA 70 or provide ground plates.
 - 1. Outdoor Installations: Unless otherwise indicated, install with top of rod 6 inches (150 mm) below finished grade.
 - 2. Indoor Installations: Unless otherwise indicated, install with 4 inches (100 mm) of top of rod exposed.
- D. Make grounding and bonding connections using specified connectors.
 - 1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.
 - 2. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.
 - 3. Exothermic Welds: Make connections using molds and weld material suitable for the items to be connected in accordance with manufacturer's recommendations.
 - 4. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
 - 5. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.
- E. Identify grounding and bonding system components in accordance with Section 26 0553.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Inspect and test in accordance with NETA ATS except Section 4.
- C. Perform inspections and tests listed in NETA ATS, Section 7.13.
- D. Perform ground electrode resistance tests under normally dry conditions. Precipitation within the previous 48 hours does not constitute normally dry conditions.
- E. Investigate and correct deficiencies where measured ground resistances do not comply with specified requirements.

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

END OF SECTION 26 0526

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**SECTION 26 0529
HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS**

PART 1 GENERAL

1.01 SECTION INCLUDES

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

1.02 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete: Concrete equipment pads.
- B. Section 05 5000 - Metal Fabrications: Materials and requirements for fabricated metal supports.
- C. Section 26 0533.13 - Conduit for Electrical Systems: Additional support and attachment requirements for conduits.
- D. Section 26 0533.16 - Boxes for Electrical Systems: Additional support and attachment requirements for boxes.
- E. Section 26 5100 - Interior Lighting: Additional support and attachment requirements for interior luminaires.

1.03 REFERENCE STANDARDS

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2015.
- D. MFMA-4 - Metal Framing Standards Publication; 2004.
- E. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components to be installed.
 - 2. Coordinate the work with other trades to provide additional framing and materials required for installation.
 - 3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
 - 4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
 - 5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Sequencing:
 - 1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with Section 03 3000.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for channel (strut) framing systems, non-penetrating rooftop supports, and post-installed concrete and masonry anchors.

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- C. Shop Drawings: Include details for fabricated hangers and supports where materials or methods other than those indicated are proposed for substitution.
- D. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.06 QUALITY ASSURANCE

- A. Comply with NFPA 70.
- B. Comply with applicable building code.
- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

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

PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

- A. General Requirements:
 - 1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of electrical work.
 - 2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
 - 3. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported. Include consideration for vibration, equipment operation, and shock loads where applicable.
 - 4. Do not use products for applications other than as permitted by NFPA 70 and product listing.
 - 5. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
 - a. Indoor Dry Locations: Use zinc-plated steel or approved equivalent unless otherwise indicated.
 - b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel, stainless steel, or approved equivalent unless otherwise indicated.
 - c. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
 - d. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.
- B. Conduit and Cable Supports: Straps, clamps, etc. suitable for the conduit or cable to be supported.
 - 1. Conduit Straps: One-hole or two-hole type; steel or malleable iron.
 - 2. Conduit Clamps: Bolted type unless otherwise indicated.
- C. Outlet Box Supports: Hangers, brackets, etc. suitable for the boxes to be supported.
- D. Metal Channel (Strut) Framing Systems: Factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
 - 1. Comply with MFMA-4.
 - 2. Channel Material:
 - a. Indoor Dry Locations: Use painted steel, zinc-plated steel, or galvanized steel.
 - b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel.
 - 3. Minimum Channel Thickness: Steel sheet, 12 gage, 0.1046 inch (2.66 mm).
 - 4. Minimum Channel Dimensions: 1-5/8 inch (41 mm) width by 13/16 inch (21 mm) height.
 - 5. Manufacturers:
 - a. Cooper B-Line, a division of Eaton Corporation: www.cooperindustries.com/#sle.

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- b. Thomas & Betts Corporation: www.tnb.com/#sle.
 - c. Unistrut, a brand of Atkore International Inc: www.unistrut.com/#sle.
 - d. Substitutions: See Section 01 6000 - Product Requirements.
- E. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.
- 1. Minimum Size, Unless Otherwise Indicated or Required:
 - a. Equipment Supports: 1/2 inch (13 mm) diameter.
 - b. Single Conduit up to 1 inch (27 mm) trade size: 1/4 inch (6 mm) diameter.
 - c. Single Conduit larger than 1 inch (27 mm) trade size: 3/8 inch (10 mm) diameter.
 - d. Trapeze Support for Multiple Conduits: 3/8 inch (10 mm) diameter.
 - e. Outlet Boxes: 1/4 inch (6 mm) diameter.
 - f. Luminaires: 1/4 inch (6 mm) diameter.
- F. Anchors and Fasteners:
- 1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.
 - 2. Concrete: Use preset concrete inserts, expansion anchors, or screw anchors.
 - 3. Solid or Grout-Filled Masonry: Use expansion anchors or screw anchors.
 - 4. Hollow Masonry: Use toggle bolts.
 - 5. Hollow Stud Walls: Use toggle bolts.
 - 6. Steel: Use beam clamps, machine bolts, or welded threaded studs.
 - 7. Sheet Metal: Use sheet metal screws.
 - 8. Wood: Use wood screws.
 - 9. Plastic and lead anchors are not permitted.
 - 10. Preset Concrete Inserts: Continuous metal channel (strut) and spot inserts specifically designed to be cast in concrete ceilings, walls, and floors.
 - a. Comply with MFMA-4.
 - b. Channel Material: Use galvanized steel.
 - c. Manufacturer: Same as manufacturer of metal channel (strut) framing system.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive support and attachment components.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
- D. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.
- E. Unless specifically indicated or approved by Architect, do not provide support from roof deck.
- F. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.
- G. Equipment Support and Attachment:
 - 1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
 - 2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
 - 3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.

- 4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.
- H. Cable Tray Support and Attachment: Also comply with Section 26 0536.
- I. Box Support and Attachment: Also comply with Section 26 0533.16.
- J. Busway Support and Attachment: Also comply with Section 26 2513.
- K. Interior Luminaire Support and Attachment: Also comply with Section 26 5100.
- L. Preset Concrete Inserts: Use manufacturer provided closure strips to inhibit concrete seepage during concrete pour.
- M. Secure fasteners according to manufacturer's recommended torque settings.
- N. Remove temporary supports.
- O. Identify independent electrical component support wires above accessible ceilings (only where specifically indicated or permitted) with color distinguishable from ceiling support wires in accordance with NFPA 70.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Inspect support and attachment components for damage and defects.
- C. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.
- D. Correct deficiencies and replace damaged or defective support and attachment components.

END OF SECTION 26 0529

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**SECTION 26 0533.13
CONDUIT FOR ELECTRICAL SYSTEMS**

PART 1 GENERAL

1.01 SECTION INCLUDES

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

1.02 RELATED REQUIREMENTS

- A. Section 26 0519 - Low-Voltage Electrical Power Conductors and Cables: Metal clad cable (Type MC), armored cable (Type AC), and manufactured wiring systems, including uses permitted.
- B. Section 26 0526 - Grounding and Bonding for Electrical Systems.
 - 1. Includes additional requirements for fittings for grounding and bonding.
- C. Section 26 0529 - Hangers and Supports for Electrical Systems.
- D. Section 26 0533.16 - Boxes for Electrical Systems.
- E. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- F. Section 26 2100 - Low-Voltage Electrical Service Entrance: Additional requirements for electrical service conduits.
- G. Section 27 1000 - Structured Cabling for Voice and Data: Additional requirements for communications systems conduits.

1.03 REFERENCE STANDARDS

- A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC); 2015.
- B. ANSI C80.3 - American National Standard for Electrical Metallic Tubing -- Steel (EMT-S); 2015.
- C. ANSI C80.6 - American National Standard for Electrical Intermediate Metal Conduit (EIMC); 2005.
- D. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- E. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT); 2013.
- F. NECA 111 - Standard for Installing Nonmetallic Raceways (RNC, ENT, LFNC); 2003.
- G. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2014.
- H. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit; 2013.
- I. NEMA TC 3 - Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing; 2015.
- J. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- K. UL 1 - Flexible Metal Conduit; Current Edition, Including All Revisions.
- L. UL 6 - Electrical Rigid Metal Conduit-Steel; Current Edition, Including All Revisions.
- M. UL 360 - Liquid-Tight Flexible Steel Conduit; Current Edition, Including All Revisions.

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- N. UL 514B - Conduit, Tubing, and Cable Fittings; Current Edition, Including All Revisions.
- O. UL 651 - Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings; Current Edition, Including All Revisions.
- P. UL 797 - Electrical Metallic Tubing-Steel; Current Edition, Including All Revisions.
- Q. UL 1242 - Electrical Intermediate Metal Conduit-Steel; Current Edition, Including All Revisions.
- R. UL 1660 - Liquid-Tight Flexible Nonmetallic Conduit; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate minimum sizes of conduits with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
 - 2. Coordinate the arrangement of conduits with structural members, ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
 - 3. Verify exact conduit termination locations required for boxes, enclosures, and equipment installed under other sections or by others.
 - 4. Coordinate the work with other trades to provide roof penetrations that preserve the integrity of the roofing system and do not void the roof warranty.
 - 5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Sequencing:
 - 1. Do not begin installation of conductors and cables until installation of conduit is complete between outlet, junction and splicing points.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittals procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for conduits and fittings.
- C. Shop Drawings:
 - 1. Include proposed locations of roof penetrations and proposed methods for sealing.
- D. Project Record Documents: Record actual routing for conduits installed underground, conduits embedded within concrete slabs, and conduits 2 inch (53 mm) trade size and larger.

1.06 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

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

PART 2 PRODUCTS

2.01 CONDUIT APPLICATIONS

- A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70 and product listing.
- B. Unless otherwise indicated and where not otherwise restricted, use the conduit types indicated for the specified applications. Where more than one listed application applies, comply with the most restrictive requirements. Where conduit type for a particular application is not specified, use galvanized steel rigid metal conduit.
- C. Underground:
 - 1. Under Slab on Grade: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or rigid PVC conduit.

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2. Exterior, Direct-Buried: Use galvanized steel rigid metal conduit, intermediate metallic conduit (IMC), or rigid PVC conduit.
 3. Exterior, Embedded Within Concrete: Use galvanized steel rigid metal conduit, intermediate metallic conduit (IMC), or rigid PVC conduit.
 4. Where rigid polyvinyl (PVC) conduit larger than 2 inch (53 mm) trade size is provided, use galvanized steel rigid metal conduit elbows for bends.
 5. Where steel conduit is installed in direct contact with earth where soil has a resistivity of less than 2000 ohm-centimeters or is characterized as severely corrosive based on soils report or local experience, use corrosion protection tape to provide supplementary corrosion protection or use PVC-coated galvanized steel rigid metal conduit.
 6. Where steel conduit emerges from concrete into soil, use corrosion protection tape to provide supplementary corrosion protection for a minimum of 4 inches (100 mm) on either side of where conduit emerges or use PVC-coated galvanized steel rigid metal conduit.
- D. Concealed Within Masonry Walls: Use galvanized steel rigid metal conduit or intermediate metal conduit (IMC).
 - E. Concealed Within Hollow Stud Walls: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or electrical metallic tubing (EMT).
 - F. Concealed Above Accessible Ceilings: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or electrical metallic tubing (EMT).
 - G. Interior, Damp or Wet Locations: Use galvanized steel rigid metal conduit or PVC conduit.
 - H. Exposed, Interior, Not Subject to Physical Damage: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or rigid PVC conduit.
 - I. Exposed, Interior, Subject to Physical Damage: Use galvanized steel rigid metal conduit or intermediate metal conduit (IMC).
 - J. Exposed, Exterior: Use galvanized steel rigid metal conduit or intermediate metal conduit (IMC).
 - K. Corrosive Locations Above Ground: Use PVC-coated galvanized steel rigid metal conduit or PVC conduit.
 - L. Connections to Luminaires Above Accessible Ceilings: Use flexible metal conduit.
 1. Maximum Length: 6 feet (1.8 m).
 - M. Connections to Vibrating Equipment:
 1. Dry Locations: Use flexible metal conduit.
 2. Damp, Wet, or Corrosive Locations: Use liquidtight flexible metal conduit.
 3. Maximum Length: 6 feet (1.8 m) unless otherwise indicated.
 - N. Fished in Existing Walls, Where Necessary: Use flexible metal conduit.

2.02 CONDUIT REQUIREMENTS

- A. Existing Work: Where existing conduits are indicated to be reused, they may be reused only where they comply with specified requirements, are free from corrosion, and integrity is verified by pulling a mandrel through them.
- B. Communications Systems Conduits: Also comply with Section 27 1000.
- C. Fittings for Grounding and Bonding: Also comply with Section 26 0526.
- D. Provide all conduit, fittings, supports, and accessories required for a complete raceway system.
- E. Provide products listed, classified, and labeled as suitable for the purpose intended.
- F. Minimum Conduit Size, Unless Otherwise Indicated:
 1. Branch Circuit Homeruns: 3/4 inch (21 mm) trade size.
 2. Underground, Exterior: 1 inch (27 mm) trade size.
- G. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

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2.03 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

- A. Manufacturers:
 - 1. Allied Tube & Conduit: www.alliedeg.com/#sle.
 - 2. Republic Conduit: www.republic-conduit.com/#sle.
 - 3. Wheatland Tube, a Division of Zekelman Industries: www.wheatland.com/#sle.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.
- C. Fittings:
 - 1. Manufacturers:
 - a. Bridgeport Fittings Inc: www.bptfittings.com/#sle.
 - b. O-Z/Gedney, a brand of Emerson Electric Co: www.emerson.com/#sle.
 - c. Thomas & Betts Corporation: www.tnb.com/#sle.
 - d. Substitutions: See Section 01 6000 - Product Requirements.
 - 2. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 - 3. Material: Use steel or malleable iron.
 - 4. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.04 INTERMEDIATE METAL CONDUIT (IMC)

- A. Manufacturers:
 - 1. Allied Tube & Conduit: www.alliedeg.com/#sle.
 - 2. Republic Conduit: www.republic-conduit.com/#sle.
 - 3. Wheatland Tube, a Division of Zekelman Industries: www.wheatland.com/#sle.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Description: NFPA 70, Type IMC galvanized steel intermediate metal conduit complying with ANSI C80.6 and listed and labeled as complying with UL 1242.
- C. Fittings:
 - 1. Manufacturers:
 - a. Bridgeport Fittings Inc: www.bptfittings.com/#sle.
 - b. O-Z/Gedney, a brand of Emerson Electric Co: www.emerson.com/#sle.
 - c. Thomas & Betts Corporation: www.tnb.com/#sle.
 - d. Substitutions: See Section 01 6000 - Product Requirements.
 - 2. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 - 3. Material: Use steel or malleable iron.
 - 4. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.05 FLEXIBLE METAL CONDUIT (FMC)

- A. Manufacturers:
 - 1. AFC Cable Systems, Inc: www.afcweb.com/#sle.
 - 2. Electri-Flex Company: www.electriflex.com/#sle.
 - 3. International Metal Hose: www.metalhose.com/#sle.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Description: NFPA 70, Type FMC standard wall steel flexible metal conduit listed and labeled as complying with UL 1, and listed for use in classified firestop systems to be used.
- C. Fittings:
 - 1. Manufacturers:
 - a. Bridgeport Fittings Inc: www.bptfittings.com/#sle.
 - b. O-Z/Gedney, a brand of Emerson Electric Co: www.emerson.com/#sle.

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- c. Thomas & Betts Corporation: www.tnb.com/#sle.
- d. Substitutions: See Section 01 6000 - Product Requirements.
- 2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
- 3. Material: Use steel or malleable iron.

2.06 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)

- A. Manufacturers:
 - 1. AFC Cable Systems, Inc: www.afcweb.com/#sle.
 - 2. Electri-Flex Company: www.electriflex.com/#sle.
 - 3. International Metal Hose: www.metalhose.com/#sle.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Description: NFPA 70, Type LFMC polyvinyl chloride (PVC) jacketed steel flexible metal conduit listed and labeled as complying with UL 360.
- C. Fittings:
 - 1. Manufacturers:
 - a. Bridgeport Fittings Inc: www.bptfittings.com/#sle.
 - b. O-Z/Gedney, a brand of Emerson Electric Co: www.emerson.com/#sle.
 - c. Thomas & Betts Corporation: www.tnb.com/#sle.
 - d. Substitutions: See Section 01 6000 - Product Requirements.
 - 2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 - 3. Material: Use steel or malleable iron.

2.07 ELECTRICAL METALLIC TUBING (EMT)

- A. Manufacturers:
 - 1. Allied Tube & Conduit: www.alliedeg.com/#sle.
 - 2. Republic Conduit: www.republic-conduit.com/#sle.
 - 3. Wheatland Tube, a Division of Zekelman Industries: www.wheatland.com/#sle.
- B. Description: NFPA 70, Type EMT steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.
- C. Fittings:
 - 1. Manufacturers:
 - a. Bridgeport Fittings Inc: www.bptfittings.com/#sle.
 - b. O-Z/Gedney, a brand of Emerson Electric Co: www.emerson.com/#sle.
 - c. Thomas & Betts Corporation: www.tnb.com/#sle.
 - d. Substitutions: See Section 01 6000 - Product Requirements.
 - 2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 - 3. Material: Use steel or malleable iron.
 - 4. Connectors and Couplings: Use compression (gland) or set-screw type.
 - a. Do not use indenter type connectors and couplings.
 - 5. Damp or Wet Locations (where permitted): Use fittings listed for use in wet locations.

2.08 RIGID POLYVINYL CHLORIDE (PVC) CONDUIT

- A. Manufacturers:
 - 1. Cantex Inc: www.cantexinc.com/#sle.
 - 2. Carlon, a brand of Thomas & Betts Corporation: www.carlon.com/#sle.
 - 3. JM Eagle: www.jmeagle.com/#sle.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Description: NFPA 70, Type PVC rigid polyvinyl chloride conduit complying with NEMA TC 2 and listed and labeled as complying with UL 651; Schedule 40 unless otherwise indicated, Schedule 80 where subject to physical damage; rated for use with conductors rated 90 degrees C.

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- C. Fittings:
 1. Manufacturer: Same as manufacturer of conduit to be connected.
 2. Description: Fittings complying with NEMA TC 3 and listed and labeled as complying with UL 651; material to match conduit.

2.09 LIQUIDTIGHT FLEXIBLE NONMETALLIC CONDUIT (LFNC)

- A. Manufacturers:
 1. AFC Cable Systems, Inc: www.afcweb.com/#sle.
 2. Electri-Flex Company: www.electriflex.com/#sle.
 3. International Metal Hose: www.metalhose.com/#sle.
 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Description: NFPA 70, Type LFNC liquidtight flexible nonmetallic conduit listed and labeled as complying with UL 1660.
- C. Fittings:
 1. Manufacturer: Same as manufacturer of conduit to be connected.
 2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B; suitable for the type of conduit to be connected.

2.10 ACCESSORIES

- A. Corrosion Protection Tape: PVC-based, minimum thickness of 20 mil (0.51 mm).
- B. Conduit Joint Compound: Corrosion-resistant, electrically conductive; suitable for use with the conduit to be installed.
- C. Solvent Cement for PVC Conduit and Fittings: As recommended by manufacturer of conduit and fittings to be installed.
- D. Pull Strings: Use nylon cord with average breaking strength of not less than 200 pound-force (890 N).
- E. Sealing Compound for Sealing Fittings: Listed for use with the particular fittings to be installed.

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Install galvanized steel rigid metal conduit (RMC) in accordance with NECA 101.
- D. Install intermediate metal conduit (IMC) in accordance with NECA 101.
- E. Install rigid polyvinyl chloride (PVC) conduit in accordance with NECA 111.
- F. Install liquidtight flexible nonmetallic conduit (LFNC) in accordance with NECA 111.
- G. Conduit Routing:
 1. Unless dimensioned, conduit routing indicated is diagrammatic.
 2. When conduit destination is indicated without specific routing, determine exact routing required.
 3. Conceal all conduits unless specifically indicated to be exposed.
 4. Conduits in the following areas may be exposed, unless otherwise indicated:
 - a. Electrical rooms.
 - b. Mechanical equipment rooms.
 5. Unless otherwise approved, do not route conduits exposed:
 - a. Across floors.

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- b. Across roofs.
 - c. Across building exterior surfaces.
 - 6. Arrange conduit to maintain adequate headroom, clearances, and access.
 - 7. Arrange conduit to provide no more than the equivalent of four 90 degree bends between pull points.
 - 8. Arrange conduit to provide no more than 150 feet (46 m) between pull points.
 - 9. Route conduits above water and drain piping where possible.
 - 10. Arrange conduit to prevent moisture traps. Provide drain fittings at low points and at sealing fittings where moisture may collect.
 - 11. Maintain minimum clearance of 6 inches (150 mm) between conduits and piping for other systems.
 - 12. Maintain minimum clearance of 12 inches (300 mm) between conduits and hot surfaces. This includes, but is not limited to:
 - a. Heaters.
 - b. Hot water piping.
 - c. Flues.
 - 13. Group parallel conduits in the same area together on a common rack.
- H. Conduit Support:
- 1. Secure and support conduits in accordance with NFPA 70 and Section 26 0529 using suitable supports and methods approved by the authority having jurisdiction.
 - 2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
 - 3. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conduits to lay on ceiling tiles.
 - 4. Use conduit strap to support single surface-mounted conduit.
 - a. Use clamp back spacer with conduit strap for damp and wet locations to provide space between conduit and mounting surface.
 - 5. Use metal channel (strut) with accessory conduit clamps to support multiple parallel surface-mounted conduits.
 - 6. Use conduit clamp to support single conduit from beam clamp or threaded rod.
 - 7. Use trapeze hangers assembled from threaded rods and metal channel (strut) with accessory conduit clamps to support multiple parallel suspended conduits.
 - 8. Use non-penetrating rooftop supports to support conduits routed across rooftops (only where approved).
 - 9. Use of wire for support of conduits is not permitted.
 - 10. Where conduit support intervals specified in NFPA 70 and NECA standards differ, comply with the most stringent requirements.
- I. Connections and Terminations:
- 1. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.
 - 2. Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings or split couplings. Do not use running threads.
 - 3. Use suitable adapters where required to transition from one type of conduit to another.
 - 4. Provide drip loops for liquidtight flexible conduit connections to prevent drainage of liquid into connectors.
 - 5. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.
 - 6. Provide insulating bushings or insulated throats at all conduit terminations to protect conductors.
 - 7. Secure joints and connections to provide maximum mechanical strength and electrical continuity.
- J. Penetrations:
- 1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.

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2. Make penetrations perpendicular to surfaces unless otherwise indicated.
 3. Provide sleeves for penetrations as indicated or as required to facilitate installation. Set sleeves flush with exposed surfaces unless otherwise indicated or required.
 4. Conceal bends for conduit risers emerging above ground.
 5. Seal interior of conduits entering the building from underground at first accessible point to prevent entry of moisture and gases.
 6. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.
 7. Make penetrations for roof-mounted equipment within associated equipment openings and curbs where possible to minimize roofing system penetrations. Where penetrations are necessary, seal as indicated or as required to preserve integrity of roofing system and maintain roof warranty. Include proposed locations of penetrations and methods for sealing with submittals.
 8. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 8400.
- K. Underground Installation:
1. Minimum Cover, Unless Otherwise Indicated or Required:
 - a. Underground, Exterior: 24 inches (610 mm).
 - b. Under Slab on Grade: 12 inches (300 mm) to bottom of slab.
 2. Provide underground warning tape in accordance with Section 26 0553 along entire conduit length for service entrance where not concrete-encased.
- L. Embedment Within Structural Concrete Slabs (only where approved by Structural Engineer):
1. Maximum Conduit Size: 1 inch (27 mm) unless otherwise approved.
 2. Install conduits within middle one third of slab thickness.
 3. Secure conduits to prevent floating or movement during pouring of concrete.
- M. Concrete Encasement: Where conduits not otherwise embedded within concrete are indicated to be concrete-encased, provide concrete in accordance with Section 03 3000 with minimum concrete cover of 3 inches (76 mm) on all sides unless otherwise indicated.
- N. Hazardous (Classified) Locations: Where conduits cross boundaries of hazardous (classified) locations, provide sealing fittings located as indicated or in accordance with NFPA 70.
- O. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:
1. Where conduits cross structural joints intended for expansion, contraction, or deflection.
 2. Where calculated in accordance with NFPA 70 for rigid polyvinyl chloride (PVC) conduit installed above ground to compensate for thermal expansion and contraction.
 3. Where conduits are subject to earth movement by settlement or frost.
- P. Condensation Prevention: Where conduits cross barriers between areas of potential substantial temperature differential, provide sealing fitting or approved sealing compound at an accessible point near the penetration to prevent condensation. This includes, but is not limited to:
1. Where conduits pass from outdoors into conditioned interior spaces.
 2. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.
- Q. Provide pull string in all empty conduits and in conduits where conductors and cables are to be installed by others. Leave minimum slack of 12 inches (300 mm) at each end.
- R. Provide grounding and bonding in accordance with Section 26 0526.
- S. Identify conduits in accordance with Section 26 0553.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.

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C. Correct deficiencies and replace damaged or defective conduits.

3.04 CLEANING

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

3.05 PROTECTION

A. Immediately after installation of conduit, use suitable manufactured plugs to provide protection from entry of moisture and foreign material and do not remove until ready for installation of conductors.

END OF SECTION 26 0533.13

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**SECTION 26 0533.16
BOXES FOR ELECTRICAL SYSTEMS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Outlet and device boxes up to 100 cubic inches (1,650 cu cm), including those used as junction and pull boxes.
- B. Cabinets and enclosures, including junction and pull boxes larger than 100 cubic inches (1,650 cu cm).
- C. Boxes and enclosures for integrated power, data, and audio/video.
- D. Underground boxes/enclosures.

1.02 RELATED REQUIREMENTS

- A. Section 26 0526 - Grounding and Bonding for Electrical Systems.
- B. Section 26 0529 - Hangers and Supports for Electrical Systems.
- C. Section 26 0533.13 - Conduit for Electrical Systems:
 - 1. Conduit bodies and other fittings.
 - 2. Additional requirements for locating boxes to limit conduit length and/or number of bends between pulling points.
- D. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- E. Section 26 2726 - Wiring Devices:
 - 1. Wall plates.
- F. Section 26 2813 - Fuses: Spare fuse cabinets.
- G. Section 27 1000 - Structured Cabling for Voice and Data: Additional requirements for communications systems outlet boxes.

1.03 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- B. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2010.
- C. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2014.
- D. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports; 2013.
- E. NEMA OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers and Box Supports; 2013.
- F. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.
- G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- H. SCTE 77 - Specification for Underground Enclosure Integrity; 2013.
- I. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.
- J. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.
- K. UL 508A - Industrial Control Panels; Current Edition, Including All Revisions.
- L. UL 514A - Metallic Outlet Boxes; Current Edition, Including All Revisions.
- M. UL 514C - Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:

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1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
3. Coordinate minimum sizes of boxes with the actual installed arrangement of conductors, clamps, support fittings, and devices, calculated according to NFPA 70.
4. Coordinate minimum sizes of pull boxes with the actual installed arrangement of connected conduits, calculated according to NFPA 70.
5. Coordinate the placement of boxes with millwork, furniture, devices, equipment, etc. installed under other sections or by others.
6. Coordinate the work with other trades to preserve insulation integrity.
7. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted boxes where indicated.
8. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for cabinets and enclosures, floor boxes, and underground boxes/enclosures.
- C. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 1. See Section 01 6000 - Product Requirements, for additional provisions.
 2. Keys for Lockable Enclosures: Two of each different key.

1.06 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

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

PART 2 PRODUCTS

2.01 BOXES

- A. General Requirements:
 1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
 2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
 3. Provide products listed, classified, and labeled as suitable for the purpose intended.
 4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
 5. Provide grounding terminals within boxes where equipment grounding conductors terminate.
- B. Outlet and Device Boxes Up to 100 cubic inches (1,650 cu cm), Including Those Used as Junction and Pull Boxes:
 1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.
 2. Use cast iron boxes, cast aluminum boxes, or PVC boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.

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3. Use nonmetallic boxes where exposed rigid PVC conduit is used.
 4. Use raised covers suitable for the type of wall construction and device configuration where required.
 5. Use shallow boxes where required by the type of wall construction.
 6. Do not use "through-wall" boxes designed for access from both sides of wall.
 7. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
 8. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.
 9. Nonmetallic Boxes: Comply with NEMA OS 2, and list and label as complying with UL 514C.
 10. Boxes for Supporting Luminaires and Ceiling Fans: Listed as suitable for the type and weight of load to be supported; furnished with fixture stud to accommodate mounting of luminaire where required.
 11. Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes unless specifically indicated or permitted.
 12. Minimum Box Size, Unless Otherwise Indicated:
 - a. Wiring Devices (Other Than Communications Systems Outlets): 4 inch square by 1-1/2 inch deep (100 by 38 mm) trade size.
 - b. Communications Systems Outlets: Comply with Section 27 1000.
 - c. Communications Systems Outlets: 4 inch square by 2-1/8 inch (100 by 54 mm) trade size.
 - d. Ceiling Outlets: 4 inch octagonal or square by 1-1/2 inch deep (100 by 38 mm) trade size.
 13. Wall Plates: Comply with Section 26 2726.
- C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches (1,650 cu cm):
1. Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E, or UL 508A.
 2. NEMA 250 Environment Type, Unless Otherwise Indicated:
 - a. Indoor Clean, Dry Locations: Type 1, painted steel.
 - b. Outdoor Locations: Type 3R, painted steel.
 3. Junction and Pull Boxes Larger Than 100 cubic inches (1,650 cu cm):
 - a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.
 4. Cabinets and Hinged-Cover Enclosures, Other Than Junction and Pull Boxes:
 - a. Provide lockable hinged covers, all locks keyed alike unless otherwise indicated.
 - b. Back Panels: Painted steel, removable.
 5. Finish for Painted Steel Enclosures: Manufacturer's standard grey unless otherwise indicated.
- D. Boxes and Enclosures for Integrated Power, Data, and Audio/Video: Size and configuration as indicated or as required with partitions to separate services; field-connected gangable boxes may be used.
- E. Underground Boxes/Enclosures:
1. Description: In-ground, open bottom boxes furnished with flush, non-skid covers with legend indicating type of service and stainless steel tamper resistant cover bolts.
 2. Size: As indicated on drawings.
 3. Depth: As required to extend below frost line to prevent frost upheaval, but not less than 12 inches (300 mm).
 4. Applications:
 - a. Parking Lots, in Areas Subject Only To Occasional Nondeliberate Vehicular Traffic: Use polymer concrete enclosures, with minimum SCTE 77 Tier 15 load rating.
 - b. Do not use polymer concrete enclosures in areas subject to deliberate vehicular traffic.
 5. Polymer Concrete Underground Boxes/Enclosures: Comply with SCTE 77.

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- a. Combination fiberglass/polymer concrete boxes/enclosures are acceptable.

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install boxes in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.
- C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D. Provide separate boxes for emergency power and normal power systems.
- E. Unless otherwise indicated, provide separate boxes for line voltage and low voltage systems.
- F. Flush-mount boxes in finished areas unless specifically indicated to be surface-mounted.
- G. Unless otherwise indicated, boxes may be surface-mounted where exposed conduits are indicated or permitted.
- H. Box Locations:
 - 1. Locate boxes to be accessible. Provide access panels in accordance with Section 08 3100 as required where approved by the Architect.
 - 2. Unless dimensioned, box locations indicated are approximate.
 - 3. Locate boxes as required for devices installed under other sections or by others.
 - 4. Locate boxes so that wall plates do not span different building finishes.
 - 5. Locate boxes so that wall plates do not cross masonry joints.
 - 6. Unless otherwise indicated, where multiple outlet boxes are installed at the same location at different mounting heights, install along a common vertical center line.
 - 7. Do not install flush-mounted boxes on opposite sides of walls back-to-back. Provide minimum 6 inches (150 mm) horizontal separation unless otherwise indicated.
 - 8. Acoustic-Rated Walls: Do not install flush-mounted boxes on opposite sides of walls back-to-back; provide minimum 24 inches (610 mm) horizontal separation.
 - 9. Fire Resistance Rated Walls: Install flush-mounted boxes such that the required fire resistance will not be reduced.
 - a. Do not install flush-mounted boxes on opposite sides of walls back-to-back; provide minimum 24 inches (610 mm) separation where wall is constructed with individual noncommunicating stud cavities or protect both boxes with listed putty pads.
 - 10. Locate junction and pull boxes as indicated, as required to facilitate installation of conductors, and to limit conduit length and/or number of bends between pulling points in accordance with Section 26 0533.13.
 - 11. Locate junction and pull boxes in the following areas, unless otherwise indicated:
 - a. Concealed above accessible suspended ceilings.
 - b. Within joists in areas with no ceiling.
 - c. Electrical rooms.
 - d. Mechanical equipment rooms.
- I. Box Supports:
 - 1. Secure and support boxes in accordance with NFPA 70 and Section 26 0529 using suitable supports and methods approved by the authority having jurisdiction.

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2. Provide independent support from building structure except for cast metal boxes (other than boxes used for fixture support) supported by threaded conduit connections in accordance with NFPA 70. Do not provide support from piping, ductwork, or other systems.
 3. Installation Above Suspended Ceilings: Do not provide support from ceiling grid or ceiling support system.
- J. Install boxes plumb and level.
- K. Flush-Mounted Boxes:
1. Install boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that front edge of box or associated raised cover is not set back from finished surface more than 1/4 inch (6 mm) or does not project beyond finished surface.
 2. Install boxes in combustible materials such as wood so that front edge of box or associated raised cover is flush with finished surface.
 3. Repair rough openings around boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that there are no gaps or open spaces greater than 1/8 inch (3 mm) at the edge of the box.
- L. Install boxes as required to preserve insulation integrity.
- M. Underground Boxes/Enclosures:
1. Install enclosure on gravel base, minimum 6 inches (150 mm) deep.
 2. Flush-mount enclosures located in concrete or paved areas.
 3. Mount enclosures located in landscaped areas with top at 1 inch (25 mm) above finished grade.
 4. Install additional bracing inside enclosures in accordance with manufacturer's instructions to minimize box sidewall deflections during backfilling. Backfill with cover bolted in place.
- N. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
- O. Close unused box openings.
- P. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.
- Q. Provide grounding and bonding in accordance with Section 26 0526.

3.03 CLEANING

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

3.04 PROTECTION

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

END OF SECTION 26 0533.16

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**SECTION 26 0553
IDENTIFICATION FOR ELECTRICAL SYSTEMS**

PART 1 GENERAL

1.01 SECTION INCLUDES

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

1.02 RELATED REQUIREMENTS

- A. Section 09 9113 - Exterior Painting.
- B. Section 09 9123 - Interior Painting.
- C. Section 26 0519 - Low-Voltage Electrical Power Conductors and Cables: Color coding for power conductors and cables 600 V and less; vinyl color coding electrical tape.
- D. Section 26 0573 - Power System Studies: Arc flash hazard warning labels.
- E. Section 27 1000 - Structured Cabling for Voice and Data: Identification for communications cabling and devices.

1.03 REFERENCE STANDARDS

- A. ANSI Z535.2 - American National Standard for Environmental and Facility Safety Signs; 2011.
- B. ANSI Z535.4 - American National Standard for Product Safety Signs and Labels; 2011.
- C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- D. NFPA 70E - Standard for Electrical Safety in the Workplace; 2015.
- E. UL 969 - Marking and Labeling Systems; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Verify final designations for equipment, systems, and components to be identified prior to fabrication of identification products.
- B. Sequencing:
 - 1. Do not conceal items to be identified, in locations such as above suspended ceilings, until identification products have been installed.
 - 2. Do not install identification products until final surface finishes and painting are complete.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittals procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product.
- C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation and installation of product.

1.06 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.

1.07 FIELD CONDITIONS

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

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PART 2 PRODUCTS

2.01 IDENTIFICATION REQUIREMENTS

- A. Existing Work: Unless specifically excluded, identify existing elements to remain that are not already identified in accordance with specified requirements.
- B. Identification for Equipment:
 - 1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.
 - a. Switchgear:
 - 1) Identify ampere rating.
 - 2) Identify voltage and phase.
 - 3) Identify power source and circuit number. Include location when not within sight of equipment.
 - 4) Use identification nameplate to identify load(s) served for each branch device. Do not identify spares and spaces.
 - b. Panelboards:
 - 1) Identify ampere rating.
 - 2) Identify voltage and phase.
 - 3) Identify power source and circuit number. Include location when not within sight of equipment.
 - 4) Use typewritten circuit directory to identify load(s) served for panelboards with a door. Identify spares and spaces using pencil.
 - 5) For power panelboards without a door, use identification nameplate to identify load(s) served for each branch device. Do not identify spares and spaces.
 - c. Transformers:
 - 1) Identify kVA rating.
 - 2) Identify voltage and phase for primary and secondary.
 - 3) Identify power source and circuit number. Include location when not within sight of equipment.
 - 4) Identify load(s) served. Include location when not within sight of equipment.
 - d. Enclosed switches, circuit breakers, and motor controllers:
 - 1) Identify voltage and phase.
 - 2) Identify power source and circuit number. Include location when not within sight of equipment.
 - 3) Identify load(s) served. Include location when not within sight of equipment.
 - e. Transfer Switches:
 - 1) Identify voltage and phase.
 - 2) Identify power source and circuit number for both normal power source and standby power source. Include location when not within sight of equipment.
 - 3) Identify load(s) served. Include location when not within sight of equipment.
 - 4) Identify short circuit current rating based on the specific overcurrent protective device type and settings protecting the transfer switch.
 - 2. Service Equipment:
 - a. Use identification nameplate to identify each service disconnecting means.
 - b. For buildings or structures supplied by more than one service, or any combination of branch circuits, feeders, and services, use identification nameplate or means of identification acceptable to authority having jurisdiction at each service disconnecting means to identify all other services, feeders, and branch circuits supplying that building or structure. Verify format and descriptions with authority having jurisdiction.
 - 3. Emergency System Equipment:
 - a. Use identification nameplate or voltage marker to identify emergency system equipment in accordance with NFPA 70.
 - b. Use identification nameplate at each piece of service equipment to identify type and location of on-site emergency power sources.

- c. Use identification nameplate to identify emergency operating instructions for emergency system equipment.
 - 4. Use identification nameplate to identify switchboards and panelboards utilizing a high leg delta system in accordance with NFPA 70.
 - 5. Use identification label or handwritten text using indelible marker on inside of door at each fused switch to identify required NEMA fuse class and size.
 - 6. Available Fault Current Documentation: Use identification label to identify the available fault current and date calculations were performed at locations requiring documentation by NFPA 70 including but not limited to the following.
 - a. Service equipment.
 - b. Industrial control panels.
 - c. Motor control centers.
 - d. Elevator control panels.
 - e. Industrial machinery.
 - 7. Arc Flash Hazard Warning Labels: Comply with Section 26 0573.
 - 8. Arc Flash Hazard Warning Labels: Use warning labels to identify arc flash hazards for electrical equipment, such as switchboards, panelboards, industrial control panels, meter socket enclosures, and motor control centers that are likely to require examination, adjustment, servicing, or maintenance while energized.
 - a. Minimum Size: 3.5 by 5 inches (89 mm by 127 mm).
 - b. Legend: Include orange header that reads "WARNING", followed by the word message "Arc Flash and Shock Hazard; Appropriate PPE Required; Do not operate controls or open covers without appropriate personal protection equipment; Failure to comply may result in injury or death; Refer to NFPA 70E for minimum PPE requirements" or approved equivalent.
 - c. Service Equipment: Include the following information in accordance with NFPA 70.
 - 1) Nominal system voltage.
 - 2) Available fault current.
 - 9. Use warning signs to identify electrical hazards for entrances to all rooms and other guarded locations that contain exposed live parts operating at 600 V nominal or less with the word message "DANGER; Electrical hazard; Authorized personnel only" or approved equivalent.
- C. Identification for Conductors and Cables:
 - 1. Color Coding for Power Conductors 600 V and Less: Comply with Section 26 0519.
 - 2. Use identification nameplate or identification label to identify color code for ungrounded and grounded power conductors inside door or enclosure at each piece of feeder or branch-circuit distribution equipment when premises has feeders or branch circuits served by more than one nominal voltage system.
 - 3. Use wire and cable markers to identify circuit number or other designation indicated for power, control, and instrumentation conductors and cables at the following locations:
 - a. Within boxes when more than one circuit is present.
 - b. Within equipment enclosures when conductors and cables enter or leave the enclosure.
- D. Identification for Boxes:
 - 1. Use voltage markers to identify highest voltage present.
 - 2. Use voltage markers or color coded boxes to identify systems other than normal power system.
 - a. Color-Coded Boxes: Field-painted in accordance with Section 09 9123 and 09 9113 per the same color code used for raceways.
 - 1) Emergency Power System: Red.
 - 2) Fire Alarm System: Red.
- E. Identification for Devices:
 - 1. Identification for Communications Devices: Comply with Section 27 1000.
 - 2. Wiring Device and Wallplate Finishes: Comply with Section 26 2726.

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3. Use identification label to identify fire alarm system devices.
4. Use identification label or engraved wallplate to identify serving branch circuit for all receptacles.
 - a. For receptacles in public areas or in areas as directed by Architect, provide identification on inside surface of wallplate.
5. Use identification label or engraved wallplate to identify load controlled for wall-mounted control devices controlling loads that are not visible from the control location and for multiple wall-mounted control devices installed at one location.

2.02 IDENTIFICATION NAMEPLATES AND LABELS

A. Identification Nameplates:

1. Manufacturers:
 - a. Brimar Industries, Inc: www.brimar.com/#sle.
 - b. Kolbi Pipe Marker Co: www.kolbipipemarkers.com/#sle.
 - c. Seton Identification Products: www.seton.com/#sle.
 - d. Substitutions: See Section 01 6000 - Product Requirements.
2. Materials:
 - a. Indoor Clean, Dry Locations: Use plastic nameplates.
 - b. Outdoor Locations: Use plastic, stainless steel, or aluminum nameplates suitable for exterior use.
3. Plastic Nameplates: Two-layer or three-layer laminated acrylic or electrically non-conductive phenolic with beveled edges; minimum thickness of 1/16 inch (1.6 mm); engraved text.
4. Stainless Steel Nameplates: Minimum thickness of 1/32 inch (0.8 mm); engraved or laser-etched text.
5. Aluminum Nameplates: Anodized; minimum thickness of 1/32 inch (0.8 mm); engraved or laser-etched text.
6. Mounting Holes for Mechanical Fasteners: Two, centered on sides for sizes up to 1 inch (25 mm) high; Four, located at corners for larger sizes.

B. Identification Labels:

1. Manufacturers:
 - a. Brady Corporation: www.bradyid.com/#sle.
 - b. Brother International Corporation: www.brother-usa.com/#sle.
 - c. Panduit Corp: www.panduit.com/#sle.
 - d. Substitutions: See Section 01 6000 - Product Requirements.
2. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.
3. Text: Use factory pre-printed or machine-printed text. Do not use handwritten text unless otherwise indicated.

C. Format for Equipment Identification:

1. Minimum Size: 1 inch (25 mm) by 2.5 inches (64 mm).
2. Legend:
 - a. System designation where applicable:
 - 1) Emergency Power System: Identify with text "EMERGENCY".
 - 2) Fire Alarm System: Identify with text "FIRE ALARM".
 - b. Equipment designation or other approved description.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height:
 - a. System Designation: 1 inch (25 mm).
 - b. Equipment Designation: 1/2 inch (13 mm).
5. Color:
 - a. Normal Power System: White text on black background.

D. Format for General Information and Operating Instructions:

1. Minimum Size: 1 inch (25 mm) by 2.5 inches (64 mm).

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2. Legend: Include information or instructions indicated or as required for proper and safe operation and maintenance.
 3. Text: All capitalized unless otherwise indicated.
 4. Minimum Text Height: 1/4 inch (6 mm).
 5. Color: Black text on white background unless otherwise indicated.
- E. Format for Caution and Warning Messages:
1. Minimum Size: 2 inches (51 mm) by 4 inches (100 mm).
 2. Legend: Include information or instructions indicated or as required for proper and safe operation and maintenance.
 3. Text: All capitalized unless otherwise indicated.
 4. Minimum Text Height: 1/2 inch (13 mm).
 5. Color: Black text on yellow background unless otherwise indicated.
- F. Format for Receptacle Identification:
1. Minimum Size: 3/8 inch (10 mm) by 1.5 inches (38 mm).
 2. Legend: Power source and circuit number or other designation indicated.
 3. Text: All capitalized unless otherwise indicated.
 4. Minimum Text Height: 3/16 inch (5 mm).
 5. Color: Black text on clear background.
- G. Format for Control Device Identification:
1. Minimum Size: 3/8 inch (10 mm) by 1.5 inches (38 mm).
 2. Legend: Load controlled or other designation indicated.
 3. Text: All capitalized unless otherwise indicated.
 4. Minimum Text Height: 3/16 inch (5 mm).
 5. Color: Black text on clear background.
- H. Format for Fire Alarm Device Identification:
1. Minimum Size: 3/8 inch (10 mm) by 1.5 inches (38 mm).
 2. Legend: Designation indicated and device zone or address.
 3. Text: All capitalized unless otherwise indicated.
 4. Minimum Text Height: 3/16 inch (5 mm).
 5. Color: Red text on white background.

2.03 WIRE AND CABLE MARKERS

- A. Manufacturers:
1. Brady Corporation: www.bradyid.com/#sle.
 2. HellermannTyton: www.hellermanntyton.com/#sle.
 3. Panduit Corp: www.panduit.com/#sle.
 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Markers for Conductors and Cables: Use wrap-around self-adhesive vinyl cloth, wrap-around self-adhesive vinyl self-laminating, heat-shrink sleeve, plastic sleeve, plastic clip-on, or vinyl split sleeve type markers suitable for the conductor or cable to be identified.
- C. Markers for Conductor and Cable Bundles: Use plastic marker tags secured by nylon cable ties.
- D. Legend: Power source and circuit number or other designation indicated.
- E. Text: Use factory pre-printed or machine-printed text, all capitalized unless otherwise indicated.
- F. Minimum Text Height: 1/8 inch (3 mm).
- G. Color: Black text on white background unless otherwise indicated.

2.04 VOLTAGE MARKERS

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

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- 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Markers for Boxes and Equipment Enclosures: Use factory pre-printed self-adhesive vinyl or self-adhesive vinyl cloth type markers.
- C. Minimum Size:
 - 1. Markers for Pull Boxes: 1 1/8 by 4 1/2 inches (29 by 110 mm).
 - 2. Markers for Junction Boxes: 1/2 by 2 1/4 inches (13 by 57 mm).
- D. Legend:
 - 1. Markers for Voltage Identification: Highest voltage present.
 - 2. Markers for System Identification:
 - a. Emergency Power System: Text "EMERGENCY".
- E. Color: Black text on orange background unless otherwise indicated.

2.05 UNDERGROUND WARNING TAPE

- A. Manufacturers:
 - 1. Brady Corporation; _____: www.bradyid.com/#sle.
 - 2. Brimar Industries, Inc: www.brimar.com/#sle.
 - 3. Seton Identification Products; _____: www.seton.com/#sle.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Materials: Use non-detectable type polyethylene tape suitable for direct burial, unless otherwise indicated.
- C. Non-detectable Type Tape: 6 inches (152 mm) wide, with minimum thickness of 4 mil (0.1 mm).
- D. Legend: Type of service, continuously repeated over full length of tape.
- E. Color:
 - 1. Tape for Buried Power Lines: Black text on red background.

2.06 WARNING SIGNS AND LABELS

- A. Manufacturers:
 - 1. Brimar Industries, Inc: www.brimar.com/#sle.
 - 2. Clarion Safety Systems, LLC: www.clarionsafety.com/#sle.
 - 3. Seton Identification Products: www.seton.com/#sle.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Comply with ANSI Z535.2 or ANSI Z535.4 as applicable.
- C. Warning Signs:
 - 1. Materials:
 - a. Indoor Dry, Clean Locations: Use factory pre-printed rigid plastic or self-adhesive vinyl signs.
 - b. Outdoor Locations: Use factory pre-printed rigid aluminum signs.
 - 2. Rigid Signs: Provide four mounting holes at corners for mechanical fasteners.
 - 3. Minimum Size: 7 by 10 inches (178 by 254 mm) unless otherwise indicated.
- D. Warning Labels:
 - 1. Materials: Use factory pre-printed or machine-printed self-adhesive polyester or self-adhesive vinyl labels; UV, chemical, water, heat, and abrasion resistant; produced using materials recognized to UL 969.
 - 2. Machine-Printed Labels: Use thermal transfer process printing machines and accessories recommended by label manufacturer.
 - 3. Minimum Size: 2 by 4 inches (51 mm by 102 mm) unless otherwise indicated.

PART 3 EXECUTION

3.01 PREPARATION

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

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3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance. Unless otherwise indicated, locate products as follows:
 - 1. Surface-Mounted Equipment: Enclosure front.
 - 2. Flush-Mounted Equipment: Inside of equipment door.
 - 3. Free-Standing Equipment: Enclosure front; also enclosure rear for equipment with rear access.
 - 4. Elevated Equipment: Legible from the floor or working platform.
 - 5. Branch Devices: Adjacent to device.
 - 6. Interior Components: Legible from the point of access.
 - 7. Boxes: Outside face of cover.
 - 8. Conductors and Cables: Legible from the point of access.
 - 9. Devices: Outside face of cover.
- C. Install identification products centered, level, and parallel with lines of item being identified.
- D. Secure nameplates to exterior surfaces of enclosures using stainless steel screws and to interior surfaces using self-adhesive backing or epoxy cement.
- E. Install self-adhesive labels and markers to achieve maximum adhesion, with no bubbles or wrinkles and edges properly sealed.
- F. Install underground warning tape above buried lines with one tape per trench at 3 inches (75 mm) below finished grade.
- G. Secure rigid signs using stainless steel screws.
- H. Mark all handwritten text, where permitted, to be neat and legible.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Replace self-adhesive labels and markers that exhibit bubbles, wrinkles, curling or other signs of improper adhesion.

END OF SECTION 26 0553

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**SECTION 26 0583
WIRING CONNECTIONS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electrical connections to equipment.

1.02 RELATED REQUIREMENTS

- A. Section 26 0519 - Low-Voltage Electrical Power Conductors and Cables.
- B. Section 26 0533.13 - Conduit for Electrical Systems.
- C. Section 26 0533.16 - Boxes for Electrical Systems.
- D. Section 26 2726 - Wiring Devices.
- E. Section 26 2816.16 - Enclosed Switches.
- F. Section 26 2913 - Enclosed Controllers.

1.03 REFERENCE STANDARDS

- A. NEMA WD 1 - General Color Requirements for Wiring Devices; 1999 (R2015).
- B. NEMA WD 6 - Wiring Devices - Dimensional Specifications; 2016.
- C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 ADMINISTRATIVE REQUIREMENTS

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

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide wiring device manufacturer's catalog information showing dimensions, configurations, and construction.

1.06 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Products: Listed, classified, and labeled as suitable for the purpose intended.
- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Cords and Caps: NEMA WD 6; match receptacle configuration at outlet provided for equipment.
 - 1. Colors: Conform to NEMA WD 1.
 - 2. Cord Construction: NFPA 70, Type SO, multiconductor flexible cord with identified equipment grounding conductor, suitable for use in damp locations.
 - 3. Size: Suitable for connected load of equipment, length of cord, and rating of branch circuit overcurrent protection.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.

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- B. Disconnect Switches: As specified in Section 26 2816.16 and in individual equipment sections.
- C. Wiring Devices: As specified in Section 26 2726.
- D. Flexible Conduit: As specified in Section 26 0533.13.
- E. Wire and Cable: As specified in Section 26 0519.
- F. Boxes: As specified in Section 26 0533.16.

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 ELECTRICAL CONNECTIONS

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

END OF SECTION 26 0583

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**SECTION 26 2100
LOW-VOLTAGE ELECTRICAL SERVICE ENTRANCE**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electrical service requirements.

1.02 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete: Materials and installation requirements for cast-in-place concrete equipment pads.
- B. Section 26 0519 - Low-Voltage Electrical Power Conductors and Cables.
- C. Section 26 0526 - Grounding and Bonding for Electrical Systems.
- D. Section 26 0529 - Hangers and Supports for Electrical Systems.
- E. Section 26 0533.13 - Conduit for Electrical Systems.
- F. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- G. Section 26 2300 - Low-Voltage Switchgear: Service entrance equipment.
- H. Section 26 2416 - Panelboards: Service entrance equipment.
- I. Section 26 2816.16 - Enclosed Switches: Service entrance equipment.
- J. Section 26 4300 - Surge Protective Devices: Service entrance surge protective devices.
- K. Section 31 2316.13 - Trenching: Excavating, bedding, and backfilling.
- L. Section 33 7119 - Electrical Underground Ducts, Ductbanks, and Manholes.

1.03 PRICE AND PAYMENT PROCEDURES

- A. Allowances:
 - 1. See Section 01 2100 - Allowances, for allowances affecting this section.
 - 2. Include cash allowance for Utility Company charges associated with providing service.

1.04 DEFINITIONS

- A. Service Point: The point of connection between the facilities of the serving utility and the premises wiring as defined in NFPA 70, and as designated by the Utility Company.

1.05 REFERENCE STANDARDS

- A. IEEE C2 - National Electrical Safety Code; 2012.
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.06 ADMINISTRATIVE REQUIREMENTS

- A. No later than two weeks following date of the Agreement, notify Utility Company of anticipated date of service.
- B. Coordination:
 - 1. Verify the following with Utility Company representative:
 - a. Utility Company requirements, including division of responsibility.
 - b. Exact location and details of utility point of connection.
 - c. Utility easement requirements.
 - d. Utility Company charges associated with providing service.
 - 2. Coordinate the work with other trades to avoid placement of other utilities or obstructions within the spaces dedicated for electrical service and associated equipment.
 - 3. Coordinate arrangement of service entrance equipment with the dimensions and clearance requirements of the actual equipment to be installed.

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- 4. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- C. Arrange for Utility Company to provide permanent electrical service. Prepare and submit documentation required by Utility Company.
- D. Utility Company charges associated with providing permanent service to be paid by Owner.
- E. Preinstallation Meeting: Convene one week prior to commencing work of this section to review service requirements and details with Utility Company representative.
- F. Scheduling:
 - 1. Arrange for inspections necessary to obtain Utility Company approval of installation.

1.07 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product. Include ratings, configurations, standard wiring diagrams, outline and support point dimensions, finishes, weights, service condition requirements, and installed features.
- C. Shop Drawings: Include dimensioned plan views and sections indicating locations and arrangement of Utility Company and service entrance equipment, metering provisions, required clearances, and proposed service routing.
- D. Project Record Documents: Record actual locations of equipment and installed service routing.

1.08 QUALITY ASSURANCE

- A. Comply with the following:
 - 1. IEEE C2 (National Electrical Safety Code).
 - 2. NFPA 70 (National Electrical Code).
 - 3. The requirements of the Utility Company.
 - 4. The requirements of the local authorities having jurisdiction.
- B. Products: Listed, classified, and labeled as suitable for the purpose intended.
- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.
- B. Store products indoors in a clean, dry space having a uniform temperature to prevent condensation (including outdoor rated products which are not weatherproof until completely and properly installed). Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- C. Handle products carefully to avoid damage to internal components, enclosure, and finish.

PART 2 PRODUCTS

2.01 ELECTRICAL SERVICE REQUIREMENTS

- A. Provide new electrical service consisting of all required conduits, conductors, equipment, metering provisions, supports, accessories, etc. as necessary for connection between Utility Company point of supply and service entrance equipment.
- B. Electrical Service Characteristics:
 - 1. Service Type: Underground.
 - 2. Service Voltage: 480Y/277 V, 3 phase, 60 Hz.
- C. Utility Company: As indicated on drawings.
- D. Division of Responsibility:
 - 1. Pole-Mounted Utility Transformers:
 - a. Utility Poles: Furnished and installed by Utility Company.
 - b. Transformers: Furnished and installed by Utility Company.

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- c. Transformer Grounding Provisions: Furnished and installed by Utility Company.
- d. Secondary - Underground Service:
 - 1) Conduits: Furnished and installed by Contractor.
 - 2) Conductors: Furnished and installed by Contractor (Service Point at utility pole).
- 2. Terminations at Service Point: Provided by Utility Company.
- 3. Metering Provisions:
 - a. Meter Bases: Furnished and installed by Contractor per Utility Company requirements.
 - b. Metering Compartments in Service Entrance Equipment: Furnished and installed by Contractor per Utility Company requirements.
 - c. Metering Transformers: Furnished and installed by Utility Company.
 - d. Conduits Between Metering Transformers and Meters: Furnished and installed by Contractor per Utility Company requirements.
 - e. Wiring Between Metering Transformers and Meters: Furnished and installed by Utility Company.
- E. Products Furnished by Contractor: Comply with Utility Company requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that ratings and configurations of service entrance equipment are consistent with the indicated requirements.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

- A. Verify and mark locations of existing underground utilities.

3.03 INSTALLATION

- A. Install products in accordance with manufacturer's instructions and Utility Company requirements.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Arrange equipment to provide minimum clearances and required maintenance access.
- D. Provide required trenching and backfilling in accordance with Section 31 2316.13.
- E. Construct cast-in-place concrete pads for utility equipment in accordance with Utility Company requirements and Section 03 3000.
- F. Provide required protective bollards in accordance with Utility Company requirements.
- G. Provide required support and attachment components in accordance with Section 26 0529.
- H. Provide grounding and bonding for service entrance equipment in accordance with Section 26 0526.
- I. Identify service entrance equipment, including main service disconnect(s) in accordance with Section 26 0553.

3.04 PROTECTION

- A. Protect installed equipment from subsequent construction operations.

END OF SECTION 26 2100

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**SECTION 26 2200
LOW-VOLTAGE TRANSFORMERS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General purpose transformers.

1.02 RELATED REQUIREMENTS

- A. Section 26 0526 - Grounding and Bonding for Electrical Systems.
- B. Section 26 0529 - Hangers and Supports for Electrical Systems.
- C. Section 26 0533.13 - Conduit for Electrical Systems: Flexible conduit connections.
- D. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- E. Section 26 2416 - Panelboards.

1.03 REFERENCE STANDARDS

- A. 10 CFR 431, Subpart K - Energy Efficiency Program for Certain Commercial and Industrial Equipment - Distribution Transformers; Current Edition.
- B. IEEE C57.94 - IEEE Recommended Practice for Installation, Application, Operation, and Maintenance of Dry-Type Distribution and Power Transformers; 2015.
- C. IEEE C57.96 - Guide for Loading Dry-Type Distribution and Power Transformers; 2013.
- D. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- E. NECA 409 - Standard for Installing and Maintaining Dry-Type Transformers; 2015.
- F. NEMA ST 20 - Dry-Type Transformers for General Applications; 2014.
- G. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.
- H. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2013.
- I. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- J. UL 506 - Standard for Specialty Transformers; Current Edition, Including All Revisions.
- K. UL 1561 - Standard for Dry-Type General Purpose and Power Transformers; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances required by NFPA 70.
 - 2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 3. Coordinate the work with placement of supports, anchors, etc. required for mounting.
 - 4. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
 - 5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Include voltage, kVA, impedance, tap configurations, insulation system class and rated temperature rise, efficiency, sound level, enclosure ratings, outline and support point dimensions, weight, required clearances, service condition requirements, and installed features.

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- 1. Vibration Isolators: Include attachment method and rated load and deflection.
- C. Shop Drawings: Provide dimensioned plan and elevation views of transformers and adjacent equipment with all required clearances indicated.
- D. Source Quality Control Test Reports: Include reports for tests designated in NEMA ST 20 as design and routine tests.
- E. Field Quality Control Test Reports.
- F. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- G. Maintenance Data: Include recommended maintenance procedures and intervals.
- H. Project Record Documents: Record actual locations of transformers.

1.06 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- B. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to transformer internal components, enclosure, and finish.

1.08 FIELD CONDITIONS

- A. Ambient Temperature: Do not exceed the following maximum temperatures during and after installation of transformers.
 - 1. Greater than 10 kVA: 104 degrees F (40 degrees C) maximum.
 - 2. Less than 10 kVA: 77 degrees F (25 degrees C) maximum.

1.09 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. ABB/GE: www.geindustrial.com/#sle.
- B. Eaton Corporation: www.eaton.com/#sle.
- C. Schneider Electric; Square D Products: www.schneider-electric.us/#sle.
- D. Siemens Industry, Inc: www.usa.siemens.com/#sle.
- E. Substitutions: See Section 01 6000 - Product Requirements.
- F. Source Limitations: Furnish transformers produced by the same manufacturer as the other electrical distribution equipment used for this project and obtained from a single supplier.

2.02 TRANSFORMERS - GENERAL REQUIREMENTS

- A. Description: Factory-assembled, dry type transformers for 60 Hz operation designed and manufactured in accordance with NEMA ST 20 and listed, classified, and labeled as suitable for the purpose intended.
- B. Unless noted otherwise, transformer ratings indicated are for continuous loading according to IEEE C57.96 under the following service conditions:

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1. Altitude: Less than 3,300 feet (1,000 m).
2. Ambient Temperature:
 - a. Greater than 10 kVA: Not exceeding 104 degrees F (40 degrees C).
 - b. Less than 10 kVA: Not exceeding 77 degrees F (25 degrees C).
- C. Core: High grade, non-aging silicon steel with high magnetic permeability and low hysteresis and eddy current losses. Keep magnetic flux densities substantially below saturation point, even at 10 percent primary overvoltage. Tightly clamp core laminations to prevent plate movement and maintain consistent pressure throughout core length.
- D. Impregnate core and coil assembly with non-hydroscopic thermo-setting varnish to effectively seal out moisture and other contaminants.
- E. Basic Impulse Level: 10 kV.
- F. Ground core and coil assembly to enclosure by means of a visible flexible copper grounding strap.
- G. Isolate core and coil from enclosure using vibration-absorbing mounts.
- H. Nameplate: Include transformer connection data, ratings, wiring diagrams, and overload capacity based on rated winding temperature rise.

2.03 GENERAL PURPOSE TRANSFORMERS

- A. Description: Self-cooled, two winding transformers listed and labeled as complying with UL 506 or UL 1561; ratings as indicated on the drawings.
- B. Primary Voltage: 480V single phase.
- C. Secondary Voltage: 120/240 volts, 1 phase.
- D. Insulation System and Allowable Average Winding Temperature Rise:
 1. Less than 15 kVA: Class 180 degrees C insulation system with 115 degrees C average winding temperature rise.
 2. 15 kVA and Larger: Class 220 degrees C insulation system with 150 degrees C average winding temperature rise.
- E. Coil Conductors: Continuous aluminum windings with terminations brazed or welded.
- F. Winding Taps:
 1. Less than 3 kVA: None.
 2. 3 kVA through 15 kVA: Two 5 percent full capacity primary taps below rated voltage.
- G. Energy Efficiency: Comply with 10 CFR 431, Subpart K.
- H. Sound Levels: Standard sound levels complying with NEMA ST 20
- I. Mounting Provisions:
 1. Less than 15 kVA: Suitable for wall mounting.
- J. Transformer Enclosure: Comply with NEMA ST 20.
 1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
 - a. Indoor clean, dry locations: Type 2.
 - b. Outdoor locations: Type 3R.
 2. Construction: Steel.
 - a. Less than 15 kVA: Totally enclosed, non-ventilated.
 3. Finish: Manufacturer's standard grey, suitable for outdoor installations.
 4. Provide lifting eyes or brackets.
- K. Accessories:
 1. Mounting Brackets: Provide manufacturer's standard brackets.
 2. Weathershield Kits: Provide for ventilated transformers installed outdoors to provide a listed NEMA 250, type 3R assembly.
 3. Lug Kits: Sized as required for termination of conductors as indicated on the drawings.

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2.04 SOURCE QUALITY CONTROL

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

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that suitable support frames and anchors are installed where required and that mounting surfaces are ready to receive transformers.
- C. Perform pre-installation tests and inspections on transformers per manufacturer's instructions and as specified in NECA 409. Correct deficiencies prior to installation.
- D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship).
- B. Install products in accordance with manufacturer's instructions.
- C. Install transformers in accordance with NECA 409 and IEEE C57.94.
- D. Use flexible conduit, under the provisions of Section 26 0533.13, 2 feet (600 mm) minimum length, for connections to transformer case. Make conduit connections to side panel of enclosure.
- E. Arrange equipment to provide minimum clearances as specified on transformer nameplate and in accordance with manufacturer's instructions and NFPA 70.
- F. Install transformers plumb and level.
- G. Transformer Support:
 - 1. Provide required support and attachment in accordance with Section 26 0529, where not furnished by transformer manufacturer.
 - 2. Use integral transformer flanges, accessory brackets furnished by manufacturer, or field-fabricated supports to support wall-mounted transformers.
 - 3. Unless otherwise indicated, mount floor-mounted transformers on properly sized 3 inch (80 mm) high concrete pad constructed in accordance with Section 03 3000.
 - 4. Use trapeze hangers assembled from threaded rods and metal channel (strut) to support suspended transformers. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
- H. Provide grounding and bonding in accordance with Section 26 0526.
- I. Remove shipping braces and adjust bolts that attach the core and coil mounting bracket to the enclosure according to manufacturer's recommendations in order to reduce audible noise transmission.
- J. Where not factory-installed, install lugs sized as required for termination of conductors as indicated.
- K. Where furnished as a separate accessory, install transformer weathershield per manufacturer's instructions.
- L. Identify transformers in accordance with Section 26 0553.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Perform inspections and tests listed in NETA ATS Sections 7.2.1.1 and 7.2.1.2. Tests and inspections listed as optional are not required.

3.04 ADJUSTING

- A. Measure primary and secondary voltages and make appropriate tap adjustments.

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

3.05 CLEANING

- A. Clean dirt and debris from transformer components according to manufacturer's instructions.
- B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION 26 2200

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**SECTION 26 2416
PANELBOARDS**

PART 1 GENERAL

1.01 SECTION INCLUDES

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

1.02 RELATED REQUIREMENTS

- A. Section 26 0526 - Grounding and Bonding for Electrical Systems.
- B. Section 26 0529 - Hangers and Supports for Electrical Systems.
- C. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- D. Section 26 2200 - Low-Voltage Transformers: Small power centers with integral primary breaker, transformer, and panelboard.
- E. Section 26 4300 - Surge Protective Devices.

1.03 REFERENCE STANDARDS

- A. FS W-C-375 - Circuit Breakers, Molded Case; Branch Circuit and Service; 2013e, with Amendments (2022).
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- C. NECA 407 - Standard for Installing and Maintaining Panelboards; 2015.
- D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.
- E. NEMA PB 1 - Panelboards; 2011.
- F. NEMA PB 1.1 - General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 1000 Volts or Less; 2023.
- G. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2013.
- H. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- I. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.
- J. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.
- K. UL 67 - Panelboards; Current Edition, Including All Revisions.
- L. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures; Current Edition, Including All Revisions.
- M. UL 869A - Reference Standard for Service Equipment; Current Edition, Including All Revisions.
- N. UL 943 - Ground-Fault Circuit-Interrupters; Current Edition, Including All Revisions.
- O. UL 1053 - Ground-Fault Sensing and Relaying Equipment; Current Edition, Including All Revisions.
- P. UL 1699 - Arc-Fault Circuit-Interrupters; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.

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2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
3. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted panelboards where indicated.
4. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for panelboards, enclosures, overcurrent protective devices, and other installed components and accessories.
 1. Include characteristic trip curves for each type and rating of overcurrent protective device upon request.
- C. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, overcurrent protective device arrangement and sizes, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.
 1. Include dimensioned plan and elevation views of panelboards and adjacent equipment with all required clearances indicated.
 2. Include wiring diagrams showing all factory and field connections.
 3. Clearly indicate whether proposed short circuit current ratings are fully rated or, where acceptable, series rated systems.
 4. Include documentation of listed series ratings upon request.
- D. Source Quality Control Test Reports: Include reports for tests designated in NEMA PB 1 as routine tests.
- E. Field Quality Control Test Reports.
- F. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- G. Project Record Documents: Record actual installed locations of panelboards and actual installed circuiting arrangements.
- H. Maintenance Data: Include information on replacement parts and recommended maintenance procedures and intervals.
- I. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 1. See Section 01 6000 - Product Requirements, for additional provisions.
 2. Panelboard Keys: Two of each different key.

1.06 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store panelboards in accordance with manufacturer's instructions and NECA 407.
- B. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

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- C. Handle carefully in accordance with manufacturer's written instructions to avoid damage to panelboard internal components, enclosure, and finish.

1.08 FIELD CONDITIONS

- A. Maintain ambient temperature within the following limits during and after installation of panelboards:
 - 1. Panelboards Containing Circuit Breakers: Between 23 degrees F (-5 degrees C) and 104 degrees F (40 degrees C).

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. ABB/GE: www.geindustrial.com/#sle.
- B. Eaton Corporation: www.eaton.com/#sle.
- C. Schneider Electric; Square D Products: www.schneider-electric.us/#sle.
- D. Siemens Industry, Inc: www.usa.siemens.com/#sle.
- E. Substitutions: See Section 01 6000 - Product Requirements.
- F. Source Limitations: Furnish panelboards and associated components produced by the same manufacturer as the other electrical distribution equipment used for this project and obtained from a single supplier.

2.02 PANELBOARDS - GENERAL REQUIREMENTS

- A. Provide products listed, classified, and labeled as suitable for the purpose intended.
- B. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
 - 1. Altitude: Less than 6,600 feet (2,000 m).
 - 2. Ambient Temperature:
 - a. Panelboards Containing Circuit Breakers: Between 23 degrees F (-5 degrees C) and 104 degrees F (40 degrees C).
- C. Short Circuit Current Rating:
 - 1. Provide panelboards with listed short circuit current rating not less than the available fault current at the installed location as indicated on the drawings.
 - 2. Provide panelboards with listed short circuit current rating not less than the available fault current at the installed location as determined by short circuit study performed in accordance with Section 26 0573.
- D. Panelboards Used for Service Entrance: Listed and labeled as suitable for use as service equipment according to UL 869A.
- E. Mains: Configure for top or bottom incoming feed as indicated or as required for the installation.
- F. Branch Overcurrent Protective Devices: Replaceable without disturbing adjacent devices.
- G. Bussing: Sized in accordance with UL 67 temperature rise requirements.
 - 1. Provide fully rated neutral bus unless otherwise indicated, with a suitable lug for each feeder or branch circuit requiring a neutral connection.
 - 2. Provide solidly bonded equipment ground bus in each panelboard, with a suitable lug for each feeder and branch circuit equipment grounding conductor.
- H. Conductor Terminations: Suitable for use with the conductors to be installed.
- I. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
 - 1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
 - a. Indoor Clean, Dry Locations: Type 1.
 - b. Outdoor Locations: Type 3R.
 - 2. Boxes: Galvanized steel unless otherwise indicated.

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- a. Provide wiring gutters sized to accommodate the conductors to be installed.
 - b. Provide painted steel boxes for surface-mounted panelboards where indicated, finish to match fronts.
- 3. Fronts:
 - a. Fronts for Surface-Mounted Enclosures: Same dimensions as boxes.
 - b. Fronts for Flush-Mounted Enclosures: Overlap boxes on all sides to conceal rough opening.
 - c. Finish for Painted Steel Fronts: Manufacturer's standard grey unless otherwise indicated.
- 4. Lockable Doors: All locks keyed alike unless otherwise indicated.
- 5. With hinged covers.
- J. Future Provisions: Prepare all unused spaces for future installation of devices including bussing, connectors, mounting hardware and all other required provisions.
- K. Surge Protective Devices: Where factory-installed, internally mounted surge protective devices are provided in accordance with Section 26 4300, list and label panelboards as a complete assembly including surge protective device.
- L. Ground Fault Protection: Where ground-fault protection is indicated, provide system listed and labeled as complying with UL 1053.
 - 1. Where electronic circuit breakers equipped with integral ground fault protection are used, provide separate neutral current sensor where applicable.
 - 2. Where accessory ground fault sensing and relaying equipment is used, equip companion overcurrent protective devices with ground-fault shunt trips.
 - a. Use zero sequence ground fault detection method unless otherwise indicated.
 - b. Provide test panel and field-adjustable ground fault pick-up and delay settings.
- M. Multi-Section Panelboards: Provide enclosures of the same height, with feed-through lugs or sub-feed lugs and feeders as indicated or as required to interconnect sections.
- N. Load centers are not acceptable.
- O. Provide the following features and accessories where indicated or where required to complete installation:
 - 1. Feed-through lugs.
 - 2. Sub-feed lugs.

2.03 POWER DISTRIBUTION PANELBOARDS

- A. Description: Panelboards complying with NEMA PB 1, power and feeder distribution type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.
- B. Conductor Terminations:
 - 1. Main and Neutral Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
 - 2. Main and Neutral Lug Type: Mechanical.
- C. Bussing:
 - 1. Phase and Neutral Bus Material: Aluminum.
 - 2. Ground Bus Material: Aluminum.
- D. Circuit Breakers:
 - 1. Provide bolt-on type or plug-in type secured with locking mechanical restraints.
 - 2. Provide thermal magnetic circuit breakers unless otherwise indicated.
 - 3. Provide electronic trip circuit breakers where indicated.
- E. Enclosures:
 - 1. Provide surface-mounted enclosures unless otherwise indicated.
 - 2. Fronts: Provide door-in-door trim with hinged cover for access to load terminals and wiring gutters, and separate lockable hinged door with concealed hinges for access to overcurrent protective device handles without exposing live parts.

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3. Provide clear plastic circuit directory holder mounted on inside of door.

2.04 LIGHTING AND APPLIANCE PANELBOARDS

- A. Description: Panelboards complying with NEMA PB 1, lighting and appliance branch circuit type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.
- B. Conductor Terminations:
 1. Main and Neutral Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
 2. Main and Neutral Lug Type: Mechanical.
- C. Bussing:
 1. Phase Bus Connections: Arranged for sequential phasing of overcurrent protective devices.
 2. Phase and Neutral Bus Material: Aluminum.
 3. Ground Bus Material: Aluminum.
- D. Circuit Breakers: Thermal magnetic bolt-on type unless otherwise indicated.
- E. Enclosures:
 1. Provide surface-mounted or flush-mounted enclosures as indicated.
 2. Fronts: Provide door-in-door trim with hinged cover for access to load terminals and wiring gutters, and separate lockable hinged door with concealed hinges for access to overcurrent protective device handles without exposing live parts.
 3. Provide clear plastic circuit directory holder mounted on inside of door.

2.05 OVERCURRENT PROTECTIVE DEVICES

- A. Molded Case Circuit Breakers:
 1. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers listed and labeled as complying with UL 489, and complying with FS W-C-375 where applicable; ratings, configurations, and features as indicated on the drawings.
 2. Interrupting Capacity:
 - a. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated.
 - b. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.
 3. Conductor Terminations:
 - a. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
 4. Thermal Magnetic Circuit Breakers: For each pole, furnish thermal inverse time tripping element for overload protection and magnetic instantaneous tripping element for short circuit protection.
 - a. Provide field-adjustable magnetic instantaneous trip setting for circuit breaker frame sizes 225 amperes and larger.
 - b. Provide interchangeable trip units where indicated.
 5. Electronic Trip Circuit Breakers: Furnish solid state, microprocessor-based, true rms sensing trip units.
 - a. Provide the following field-adjustable trip response settings:
 - 1) Long time pickup, adjustable by replacing interchangeable trip unit or by setting dial.
 - 2) Long time delay.
 - 3) Short time pickup and delay.
 - 4) Instantaneous pickup.
 - 5) Ground fault pickup and delay where ground fault protection is indicated.
 6. Multi-Pole Circuit Breakers: Furnish with common trip for all poles.
 7. Provide the following circuit breaker types where indicated:
 - a. Ground Fault Circuit Interrupter (GFCI) Circuit Breakers: Listed as complying with UL 943, class A for protection of personnel.

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- b. Ground Fault Equipment Protection Circuit Breakers: Designed to trip at 30 mA for protection of equipment.
 - c. Arc-Fault Circuit Interrupter (AFCI) Circuit Breakers: Combination type listed as complying with UL 1699.
 - d. 100 Percent Rated Circuit Breakers: Listed for application within the panelboard where installed at 100 percent of the continuous current rating.
8. Do not use handle ties in lieu of multi-pole circuit breakers.
 9. Provide multi-pole circuit breakers for multi-wire branch circuits as required by NFPA 70.
 10. Provide the following features and accessories where indicated or where required to complete installation:
 - a. Shunt Trip: Provide coil voltage as required for connection to indicated trip actuator.
 - b. Handle Pad-Lock Provision: For locking circuit breaker handle in OFF position.

2.06 SOURCE QUALITY CONTROL

- A. Factory test panelboards according to NEMA PB 1.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that the ratings and configurations of the panelboards and associated components are consistent with the indicated requirements.
- C. Verify that mounting surfaces are ready to receive panelboards.
- D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship).
- B. Install products in accordance with manufacturer's instructions.
- C. Install panelboards in accordance with NECA 407 and NEMA PB 1.1.
- D. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- E. Provide required support and attachment in accordance with Section 26 0529.
- F. Install panelboards plumb.
- G. Install flush-mounted panelboards so that trims fit completely flush to wall with no gaps and rough opening completely covered.
- H. Mount panelboards such that the highest position of any operating handle for circuit breakers or switches does not exceed 79 inches (2000 mm) above the floor or working platform.
- I. Provide minimum of six spare 1 inch (27 mm) trade size conduits out of each flush-mounted panelboard stubbed into accessible space above ceiling and below floor.
- J. Provide grounding and bonding in accordance with Section 26 0526.
- K. Install all field-installed branch devices, components, and accessories.
- L. Set field-adjustable ground fault protection pickup and time delay settings as indicated.
- M. Provide filler plates to cover unused spaces in panelboards.
- N. Provide circuit breaker lock-on devices to prevent unauthorized personnel from de-energizing essential loads where indicated. Also provide for the following:
 1. Emergency and night lighting circuits.
 2. Fire detection and alarm circuits.
 3. Communications equipment circuits.
 4. Intrusion detection and access control system circuits.
 5. Video surveillance system circuits.
- O. Identify panelboards in accordance with Section 26 0553.

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3.03 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Molded Case Circuit Breakers: Perform inspections and tests listed in NETA ATS, Section 7.6.1.1 for all main circuit breakers and circuit breakers larger than 400 amperes. Tests listed as optional are not required.
- D. Ground Fault Protection Systems: Test in accordance with manufacturer's instructions as required by NFPA 70.
- E. Test GFCI circuit breakers to verify proper operation.
- F. Test AFCI circuit breakers to verify proper operation.
- G. Test shunt trips to verify proper operation.
- H. Correct deficiencies and replace damaged or defective panelboards or associated components.

3.04 ADJUSTING

- A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.
- B. Adjust alignment of panelboard fronts.
- C. Load Balancing: For each panelboard, rearrange circuits such that the difference between each measured steady state phase load does not exceed 20 percent and adjust circuit directories accordingly. Maintain proper phasing for multi-wire branch circuits.

3.05 CLEANING

- A. Clean dirt and debris from panelboard enclosures and components according to manufacturer's instructions.
- B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION 26 2416

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**SECTION 26 2726
WIRING DEVICES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wall switches.
- B. Wall dimmers.
- C. Receptacles.
- D. Wall plates.

1.02 RELATED REQUIREMENTS

- A. Section 26 0519 - Low-Voltage Electrical Power Conductors and Cables: Manufactured wiring systems for use with access floor boxes with compatible pre-wired connectors.
- B. Section 26 0526 - Grounding and Bonding for Electrical Systems.
- C. Section 26 0533.16 - Boxes for Electrical Systems.
- D. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- E. Section 27 1000 - Structured Cabling for Voice and Data: Voice and data jacks.

1.03 REFERENCE STANDARDS

- A. FS W-C-596 - Connector, Electrical, Power, General Specification for; 2014h, with Amendments (2017).
- B. FS W-S-896 - Switches, Toggle (Toggle and Lock), Flush Mounted (General Specification); 2014g, with Amendment (2017).
- C. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- D. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2010.
- E. NEMA WD 1 - General Color Requirements for Wiring Devices; 1999 (R2015).
- F. NEMA WD 6 - Wiring Devices - Dimensional Specifications; 2016.
- G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- H. UL 20 - General-Use Snap Switches; Current Edition, Including All Revisions.
- I. UL 498 - Attachment Plugs and Receptacles; Current Edition, Including All Revisions.
- J. UL 514D - Cover Plates for Flush-Mounted Wiring Devices; Current Edition, Including All Revisions.
- K. UL 943 - Ground-Fault Circuit-Interrupters; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the placement of outlet boxes with millwork, furniture, equipment, etc. installed under other sections or by others.
 - 2. Coordinate wiring device ratings and configurations with the electrical requirements of actual equipment to be installed.
 - 3. Coordinate the placement of outlet boxes for wall switches with actual installed door swings.
 - 4. Coordinate the installation and preparation of uneven surfaces, such as split face block, to provide suitable surface for installation of wiring devices.
 - 5. Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.
- B. Sequencing:
 - 1. Do not install wiring devices until final surface finishes and painting are complete.

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1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.
 - 1. Wall Dimmers: Include derating information for ganged multiple devices.
- C. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- D. Operation and Maintenance Data:
 - 1. Wall Dimmers: Include information on operation and setting of presets.
 - 2. GFCI Receptacles: Include information on status indicators.
- E. Project Record Documents: Record actual installed locations of wiring devices.

1.06 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- C. Products: Listed, classified, and labeled as suitable for the purpose intended.
- D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND PROTECTION

- A. Store in a clean, dry space in original manufacturer's packaging until ready for installation.

PART 2 PRODUCTS

2.01 WIRING DEVICE APPLICATIONS

- A. Provide wiring devices suitable for intended use and with ratings adequate for load served.
- B. For single receptacles installed on an individual branch circuit, provide receptacle with ampere rating not less than that of the branch circuit.
- C. Provide weather resistant GFCI receptacles with specified weatherproof covers for receptacles installed outdoors or in damp or wet locations.
- D. Provide GFCI protection for receptacles installed within 6 feet (1.8 m) of sinks.
- E. Provide GFCI protection for receptacles installed in kitchens.
- F. Provide GFCI protection for receptacles serving electric drinking fountains.

2.02 WIRING DEVICE FINISHES

- A. Provide wiring device finishes as described below unless otherwise indicated.
- B. Wiring Devices, Unless Otherwise Indicated: White with white nylon wall plate.
- C. Wiring Devices Installed in Unfinished Spaces: Gray with galvanized steel wall plate.
- D. Wiring Devices Installed in Wet or Damp Locations: White with specified weatherproof cover.

2.03 WALL SWITCHES

- A. Manufacturers:
 - 1. Hubbell Incorporated: www.hubbell.com/#sle.
 - 2. Leviton Manufacturing Company, Inc: www.leviton.com/#sle.
 - 3. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us/#sle.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.

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- B. All Wall Switches: AC only, quiet operating, general-use snap switches with silver alloy contacts, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 20 and where applicable, FS W-S-896; types as indicated on the drawings.
 - 1. Wiring Provisions: Terminal screws for side wiring and screw actuated binding clamp for back wiring with separate ground terminal screw.
- C. Standard Wall Switches: Industrial specification grade, 20 A, 120/277 V with standard toggle type switch actuator and maintained contacts; single pole single throw, double pole single throw, three way, or four way as indicated on the drawings.

2.04 RECEPTACLES

- A. Manufacturers:
 - 1. Hubbell Incorporated: www.hubbell.com/#sle.
 - 2. Leviton Manufacturing Company, Inc: www.leviton.com/#sle.
 - 3. Lutron Electronics Company, Inc; Designer Style: www.lutron.com/#sle.
 - 4. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us/#sle.
 - 5. Substitutions: See Section 01 6000 - Product Requirements.
 - 6. Source Limitations: Where wall controls are furnished as part of lighting control system, provide accessory matching receptacles and wallplates by the same manufacturer in locations indicated.
- B. Receptacles - General Requirements: Self-grounding, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 498, and where applicable, FS W-C-596; types as indicated on the drawings.
 - 1. Wiring Provisions: Terminal screws for side wiring or screw actuated binding clamp for back wiring with separate ground terminal screw.
 - 2. NEMA configurations specified are according to NEMA WD 6.
 - 3. Hospital Grade Receptacles: Listed as complying with UL 498 Supplement SD, with green dot hospital grade mark on device face.
- C. Convenience Receptacles:
 - 1. Standard Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R; single or duplex as indicated on the drawings.
 - 2. Weather Resistant Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R, listed and labeled as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations; single or duplex as indicated on the drawings.
 - 3. Tamper Resistant Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R, listed and labeled as tamper resistant type; single or duplex as indicated on the drawings.
 - 4. Tamper Resistant and Weather Resistant Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R, listed and labeled as tamper resistant type and as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations; single or duplex as indicated on the drawings.
- D. GFCI Receptacles:
 - 1. GFCI Receptacles - General Requirements: Self-testing, with feed-through protection and light to indicate ground fault tripped condition and loss of protection; listed as complying with UL 943, class A.
 - a. Provide test and reset buttons of same color as device.
 - 2. Standard GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style.
 - 3. Tamper Resistant GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as tamper resistant type.
 - 4. Tamper Resistant and Weather Resistant GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as tamper resistant type and as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations.

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2.05 WALL PLATES

- A. Manufacturers:
 - 1. Hubbell Incorporated: www.hubbell-wiring.com/#sle.
 - 2. Leviton Manufacturing Company, Inc: www.leviton.com/#sle.
 - 3. Lutron Electronics Company, Inc: www.lutron.com/#sle.
 - 4. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us/#sle.
 - 5. Substitutions: See Section 01 6000 - Product Requirements.
 - 6. Source Limitations: Where wall controls are furnished as part of lighting control system, provide accessory matching receptacles and wallplates by the same manufacturer in locations indicated.
- B. Wall Plates: Comply with UL 514D.
 - 1. Configuration: One piece cover as required for quantity and types of corresponding wiring devices.
 - 2. Size: Standard.
 - 3. Screws: Metal with slotted heads finished to match wall plate finish.
- C. Nylon Wall Plates: Smooth finish, high-impact thermoplastic.
- D. Stainless Steel Wall Plates: Brushed satin finish, Type 302 stainless steel.
- E. Galvanized Steel Wall Plates: Rounded corners and edges, with corrosion resistant screws.
- F. Weatherproof Covers for Damp Locations: Gasketed, cast aluminum, with self-closing hinged cover and corrosion-resistant screws; listed as suitable for use in wet locations with cover closed.
- G. Weatherproof Covers for Wet Locations: Gasketed, cast aluminum, with hinged lockable cover and corrosion-resistant screws; listed as suitable for use in wet locations while in use with attachment plugs connected and identified as extra-duty type.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.
- B. Verify that wall openings are neatly cut and will be completely covered by wall plates.
- C. Verify that final surface finishes are complete, including painting.
- D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.
- E. Verify that core drilled holes for poke-through assemblies are in proper locations.
- F. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.
- B. Coordinate locations of outlet boxes provided under Section 26 0533.16 as required for installation of wiring devices provided under this section.
 - 1. Mounting Heights: Unless otherwise indicated, as follows:
 - a. Wall Switches: 48 inches (1200 mm) above finished floor.
 - b. Receptacles: 18 inches (450 mm) above finished floor or 6 inches (150 mm) above counter.
 - 2. Orient outlet boxes for vertical installation of wiring devices unless otherwise indicated.

3. Where multiple receptacles, wall switches, or wall dimmers are installed at the same location and at the same mounting height, gang devices together under a common wall plate.
 4. Locate wall switches on strike side of door with edge of wall plate 3 inches (80 mm) from edge of door frame. Where locations are indicated otherwise, notify Architect to obtain direction prior to proceeding with work.
 5. Locate receptacles for electric drinking fountains concealed behind drinking fountain according to manufacturer's instructions.
- C. Install wiring devices in accordance with manufacturer's instructions.
 - D. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
 - E. Where required, connect wiring devices using pigtails not less than 6 inches (150 mm) long. Do not connect more than one conductor to wiring device terminals.
 - F. Connect wiring devices by wrapping conductor clockwise 3/4 turn around screw terminal and tightening to proper torque specified by the manufacturer. Where present, do not use push-in pressure terminals that do not rely on screw-actuated binding.
 - G. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
 - H. Provide GFCI receptacles with integral GFCI protection at each location indicated. Do not use feed-through wiring to protect downstream devices.
 - I. Where split-wired duplex receptacles are indicated, remove tabs connecting top and bottom receptacles.
 - J. Install wiring devices plumb and level with mounting yoke held rigidly in place.
 - K. Install wall switches with OFF position down.
 - L. Install vertically mounted receptacles with grounding pole on top and horizontally mounted receptacles with grounding pole on left.
 - M. Install wall plates to fit completely flush to wall with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.
 - N. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.
 - O. Identify wiring devices in accordance with Section 26 0553.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Inspect each wiring device for damage and defects.
- C. Operate each wall switch, wall dimmer, and fan speed controller with circuit energized to verify proper operation.
- D. Test each receptacle to verify operation and proper polarity.
- E. Test each GFCI receptacle for proper tripping operation according to manufacturer's instructions.
- F. Correct wiring deficiencies and replace damaged or defective wiring devices.

3.05 ADJUSTING

- A. Adjust devices and wall plates to be flush and level.
- B. Adjust presets for wall dimmers according to manufacturer's instructions as directed by Architect.

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3.06 CLEANING

- A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

END OF SECTION 26 2726

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**SECTION 26 2813
FUSES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fuses.

1.02 RELATED REQUIREMENTS

- A. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- B. Section 26 0573 - Power System Studies: Additional criteria for the selection of protective devices specified in this section.
- C. Section 26 2816.16 - Enclosed Switches: Fusible switches.
- D. Section 26 2913 - Enclosed Controllers: Fusible switches.

1.03 REFERENCE STANDARDS

- A. NEMA FU 1 - Low Voltage Cartridge Fuses; 2012.
- B. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- C. UL 248-1 - Low-Voltage Fuses - Part 1: General Requirements; Current Edition, Including All Revisions.
- D. UL 248-4 - Low-Voltage Fuses - Part 4: Class CC Fuses; Current Edition, Including All Revisions.
- E. UL 248-8 - Low-Voltage Fuses - Part 8: Class J Fuses; Current Edition, Including All Revisions.
- F. UL 248-10 - Low-Voltage Fuses - Part 10: Class L Fuses; Current Edition, Including All Revisions.
- G. UL 248-12 - Low-Voltage Fuses - Part 12: Class R Fuses; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate fuse clips furnished in equipment provided under other sections for compatibility with indicated fuses.
 - 2. Coordinate fuse requirements according to manufacturer's recommendations and nameplate data for actual equipment to be installed.
 - 3. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard data sheets including voltage and current ratings, interrupting ratings, time-current curves, and current limitation curves.
 - 1. Spare Fuse Cabinet: Include dimensions.
- C. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Extra Fuses: One set(s) of three for each type and size installed.
 - 3. Spare Fuse Cabinet Keys: Two.

1.06 QUALITY ASSURANCE

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

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

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Bussmann, a division of Eaton Corporation: www.cooperindustries.com/#sle.
- B. Littelfuse, Inc: www.littelfuse.com/#sle.
- C. Mersen: ep-us.mersen.com/#sle.
- D. Substitutions: See Section 01 6000 - Product Requirements.

2.02 APPLICATIONS

- A. Service Entrance:
 - 1. Fusible Switches up to 600 Amperes: Class RK1, time-delay.
 - 2. Fusible Switches Larger Than 600 Amperes: Class L, time-delay.
- B. Feeders:
 - 1. Fusible Switches up to 600 Amperes: Class RK1, time-delay.
 - 2. Fusible Switches Larger Than 600 Amperes: Class L, time-delay.
- C. General Purpose Branch Circuits: Class RK1, time-delay.
- D. Individual Motor Branch Circuits: Class RK1, time-delay.
- E. Primary Protection for Control Transformers: Class CC, time-delay.

2.03 FUSES

- A. Provide products listed, classified, and labeled as suitable for the purpose intended.
- B. Unless specifically indicated to be excluded, provide fuses for all fusible equipment as required for a complete operating system.
- C. Provide fuses of the same type, rating, and manufacturer within the same switch.
- D. Comply with UL 248-1.
- E. Unless otherwise indicated, provide cartridge type fuses complying with NEMA FU 1, Class and ratings as indicated.
- F. Voltage Rating: Suitable for circuit voltage.
- G. Class R Fuses: Comply with UL 248-12.
- H. Class J Fuses: Comply with UL 248-8.
- I. Class L Fuses: Comply with UL 248-10.
- J. Class CC Fuses: Comply with UL 248-4.
- K. Provide the following accessories where indicated or where required to complete installation:
 - 1. Fuseholders: Compatible with indicated fuses.
 - 2. Fuse Reducers: For adapting indicated fuses to permit installation in switch designed for fuses with larger ampere ratings.

2.04 SPARE FUSE CABINET

- A. Description: Wall-mounted sheet metal cabinet with shelves and hinged door with cylinder lock, suitably sized to store spare fuses and fuse pullers specified.
- B. Finish: Manufacturer's standard, factory applied grey finish unless otherwise indicated.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that fuse ratings are consistent with circuit voltage and manufacturer's recommendations and nameplate data for equipment.

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- B. Verify that mounting surfaces are ready to receive spare fuse cabinet.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Do not install fuses until circuits are ready to be energized.
- B. Install fuses with label oriented such that manufacturer, type, and size are easily read.
- C. Install spare fuse cabinet where indicated.
- D. Identify spare fuse cabinet in accordance with Section 26 0553.

END OF SECTION 26 2813

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**SECTION 26 2816.13
ENCLOSED CIRCUIT BREAKERS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Enclosed circuit breakers.

1.02 RELATED REQUIREMENTS

- A. Section 26 0526 - Grounding and Bonding for Electrical Systems.
- B. Section 26 0529 - Hangers and Supports for Electrical Systems.
- C. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

- A. FS W-C-375 - Circuit Breakers, Molded Case; Branch Circuit and Service; 2013e, with Amendments (2022).
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.
- D. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2013.
- E. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.
- G. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.
- H. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures; Current Edition, Including All Revisions.
- I. UL 869A - Reference Standard for Service Equipment; Current Edition, Including All Revisions.
- J. UL 943 - Ground-Fault Circuit-Interrupters; Current Edition, Including All Revisions.
- K. UL 1053 - Ground-Fault Sensing and Relaying Equipment; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate work with other trades. Avoid placement of ductwork, piping, equipment, or other potential obstructions within dedicated equipment spaces and within working clearances for electrical equipment required by NFPA 70.
 - 2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 3. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
 - 4. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for circuit breakers, enclosures, and other installed components and accessories.
- C. Shop Drawings: Indicate outline and support point dimensions, voltage and current ratings, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.

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1. Include dimensioned plan and elevation views of enclosed circuit breakers and adjacent equipment with all required clearances indicated.
 2. Include wiring diagrams showing all factory and field connections.
- D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.
- E. Project Record Documents: Record actual installed locations of enclosed circuit breakers.
- F. Maintenance Data: Include information on replacement parts and recommended maintenance procedures and intervals.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- B. Handle carefully in accordance with manufacturer's written instructions to avoid damage to enclosed circuit breaker internal components, enclosure, and finish.

1.08 FIELD CONDITIONS

- A. Maintain ambient temperature between 23 degrees F (-5 degrees C) and 104 degrees F (40 degrees C) during and after installation of enclosed circuit breakers.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. ABB/GE: www.geindustrial.com/#sle.
- B. Eaton Corporation: www.eaton.com/#sle.
- C. Schneider Electric; Square D Products: www.schneider-electric.us/#sle.
- D. Siemens Industry, Inc: www.usa.siemens.com/#sle.
- E. Substitutions: See Section 01 6000 - Product Requirements.
- F. Source Limitations: Furnish enclosed circuit breakers and associated components produced by the same manufacturer as the other electrical distribution equipment used for this project and obtained from a single supplier.

2.02 ENCLOSED CIRCUIT BREAKERS

- A. Description: Units consisting of molded case circuit breakers individually mounted in enclosures.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
 1. Altitude: Less than 6,600 feet (2,000 m).
 2. Ambient Temperature: Between 23 degrees F (-5 degrees C) and 104 degrees F (40 degrees C).
- D. Short Circuit Current Rating:
 1. Provide enclosed circuit breakers with listed short circuit current rating not less than the available fault current at the installed location indicated on the drawings.

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- E. Enclosed Circuit Breakers Used for Service Entrance: Listed and labeled as suitable for use as service equipment according to UL 869A.
- F. Conductor Terminations: Suitable for use with the conductors to be installed.
- G. Provide thermal magnetic circuit breakers unless otherwise indicated.
- H. Provide electronic trip circuit breakers where indicated.
- I. Provide insulated, groundable fully rated solid neutral assembly where a neutral connection is required, with a suitable lug for terminating each neutral conductor.
- J. Provide solidly bonded equipment ground bus in each enclosed circuit breaker, with a suitable lug for terminating each equipment grounding conductor.
- K. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
 - 1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
 - a. Indoor Clean, Dry Locations: Type 1.
 - b. Outdoor Locations: Type 3R.
 - 2. Finish for Painted Steel Enclosures: Manufacturer's standard, factory applied grey unless otherwise indicated.
 - 3. Provide surface-mounted enclosures unless otherwise indicated.
- L. Provide externally operable handle with means for locking in the OFF position.
- M. Ground Fault Protection: Where ground-fault protection is indicated, provide system listed and labeled as complying with UL 1053.

2.03 MOLDED CASE CIRCUIT BREAKERS

- A. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers listed and labeled as complying with UL 489, and complying with FS W-C-375 where applicable; ratings, configurations, and features as indicated on the drawings.
- B. Interrupting Capacity:
 - 1. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated, but not less than:
 - a. 10,000 rms symmetrical amperes at 240 VAC or 208 VAC.
 - b. 14,000 rms symmetrical amperes at 480 VAC.
 - 2. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.
- C. Conductor Terminations:
 - 1. Provide mechanical lugs unless otherwise indicated.
 - 2. Provide compression lugs where indicated.
 - 3. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
- D. Thermal Magnetic Circuit Breakers: For each pole, furnish thermal inverse time tripping element for overload protection and magnetic instantaneous tripping element for short circuit protection.
 - 1. Provide field-adjustable magnetic instantaneous trip setting for circuit breaker frame sizes 225 amperes and larger.
 - 2. Provide interchangeable trip units where indicated.
- E. Electronic Trip Circuit Breakers: Furnish solid state, microprocessor-based, true rms sensing trip units.
 - 1. Provide the following field-adjustable trip response settings:
 - a. Long time pickup, adjustable by replacing interchangeable trip unit or by setting dial.
 - b. Long time delay.
 - c. Short time pickup and delay.
 - d. Instantaneous pickup.
 - e. Ground fault pickup and delay where ground fault protection is indicated.
- F. Multi-Pole Circuit Breakers: Furnish with common trip for all poles.

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- G. Provide the following circuit breaker types where indicated:
 1. Ground Fault Circuit Interrupter (GFCI) Circuit Breakers: Listed as complying with UL 943, class A for protection of personnel.
 2. Ground Fault Equipment Protection Circuit Breakers: Designed to trip at 30 mA for protection of equipment.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that the ratings of the enclosed circuit breakers are consistent with the indicated requirements.
- C. Verify that mounting surfaces are ready to receive enclosed circuit breakers.
- D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D. Provide required support and attachment in accordance with Section 26 0529.
- E. Install enclosed circuit breakers plumb.
- F. Except where indicated to be mounted adjacent to the equipment they supply, mount enclosed circuit breakers such that the highest position of the operating handle does not exceed 79 inches (2000 mm) above the floor or working platform.
- G. Provide grounding and bonding in accordance with Section 26 0526.
- H. Where accessories are not self-powered, provide control power source as indicated or as required to complete installation.
- I. Set field-adjustable circuit breaker tripping function settings as indicated.
- J. Set field-adjustable ground fault protection pickup and time delay settings as indicated.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Inspect and test in accordance with manufacturer's instructions and NETA ATS, except Section 4.
- C. Perform inspections and tests listed in NETA ATS, Section 7.6.1.1 for circuit breakers used for service entrance and for circuit breakers larger than _____ amperes. Tests listed as optional are not required.
- D. Ground Fault Protection Systems: Test in accordance with manufacturer's instructions as required by NFPA 70.
- E. Test GFCI circuit breakers to verify proper operation.
- F. Correct deficiencies and replace damaged or defective enclosed circuit breakers.

3.04 ADJUSTING

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

3.05 CLEANING

- A. Clean dirt and debris from circuit breaker enclosures and components according to manufacturer's instructions.

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B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION 26 2816.13

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**SECTION 26 2816.16
ENCLOSED SWITCHES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Enclosed safety switches.

1.02 RELATED REQUIREMENTS

- A. Section 26 0526 - Grounding and Bonding for Electrical Systems.
- B. Section 26 0529 - Hangers and Supports for Electrical Systems.
- C. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- D. Section 26 2813 - Fuses.
- E. Section 26 2913 - Enclosed Controllers: Manual motor controllers.

1.03 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.
- C. NEMA KS 1 - Heavy Duty Enclosed and Dead-Front Switches (600 Volts Maximum); 2013.
- D. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2013.
- E. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.
- G. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.
- H. UL 98 - Enclosed and Dead-Front Switches; Current Edition, Including All Revisions.
- I. UL 869A - Reference Standard for Service Equipment; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the work with other trades. Avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and within working clearances for electrical equipment required by NFPA 70.
 - 2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 3. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
 - 4. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for enclosed switches and other installed components and accessories.
- C. Shop Drawings: Indicate outline and support point dimensions, voltage and current ratings, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.

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- D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.
- E. Project Record Documents: Record actual locations of enclosed switches.
- F. Maintenance Data: Include information on replacement parts and recommended maintenance procedures and intervals.
- G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 1. See Section 01 6000 - Product Requirements, for additional provisions.

1.06 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- B. Handle carefully in accordance with manufacturer's written instructions to avoid damage to enclosed switch internal components, enclosure, and finish.

1.08 FIELD CONDITIONS

- A. Maintain ambient temperature between -22 degrees F (-30 degrees C) and 104 degrees F (40 degrees C) during and after installation of enclosed switches.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. ABB/GE: www.geindustrial.com/#sle.
- B. Eaton Corporation: www.eaton.com/#sle.
- C. Schneider Electric; Square D Products: www.schneider-electric.us/#sle.
- D. Siemens Industry, Inc: www.usa.siemens.com/#sle.
- E. Substitutions: See Section 01 6000 - Product Requirements.
- F. Source Limitations: Furnish enclosed switches and associated components produced by the same manufacturer as the other electrical distribution equipment used for this project and obtained from a single supplier.

2.02 ENCLOSED SAFETY SWITCHES

- A. Description: Quick-make, quick-break enclosed safety switches listed and labeled as complying with UL 98; heavy duty; ratings, configurations, and features as indicated on the drawings.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
 1. Altitude: Less than 6,600 feet (2,000 m).
 2. Ambient Temperature: Between -22 degrees F (-30 degrees C) and 104 degrees F (40 degrees C).
- D. Horsepower Rating: Suitable for connected load.
- E. Voltage Rating: Suitable for circuit voltage.
- F. Short Circuit Current Rating:

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1. Provide enclosed safety switches, when protected by the fuses or supply side overcurrent protective devices to be installed, with listed short circuit current rating not less than the available fault current at the installed location as indicated on the drawings.
 2. Minimum Ratings:
 - a. Switches Protected by Class H Fuses: 10,000 rms symmetrical amperes.
 - b. Heavy Duty Single Throw Switches Protected by Class R, Class J, Class L, or Class T Fuses: 200,000 rms symmetrical amperes.
 - c. Double Throw Switches Protected by Class R, Class J, or Class T Fuses: 100,000 rms symmetrical amperes.
- G. Enclosed Safety Switches Used for Service Entrance: Listed and labeled as suitable for use as service equipment according to UL 869A.
- H. Provide with switch blade contact position that is visible when the cover is open.
- I. Fuse Clips for Fusible Switches: As required to accept fuses indicated.
 1. Where NEMA Class R fuses are installed, provide rejection feature to prevent installation of fuses other than Class R.
- J. Conductor Terminations: Suitable for use with the conductors to be installed.
- K. Provide solidly bonded equipment ground bus in each enclosed safety switch, with a suitable lug for terminating each equipment grounding conductor.
- L. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
 1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
 - a. Indoor Clean, Dry Locations: Type 1.
 - b. Outdoor Locations: Type 3R.
 2. Finish for Painted Steel Enclosures: Manufacturer's standard, factory applied grey unless otherwise indicated.
- M. Provide safety interlock to prevent opening the cover with the switch in the ON position with capability of overriding interlock for testing purposes.
- N. Heavy Duty Switches:
 1. Comply with NEMA KS 1.
 2. Conductor Terminations:
 - a. Provide mechanical lugs unless otherwise indicated.
 - b. Provide compression lugs where indicated.
 - c. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
 3. Provide externally operable handle with means for locking in the OFF position, capable of accepting three padlocks.
 - a. Provide means for locking handle in the ON position where indicated.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that the ratings of the enclosed switches are consistent with the indicated requirements.
- C. Verify that mounting surfaces are ready to receive enclosed safety switches.
- D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D. Provide required support and attachment in accordance with Section 26 0529.

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- E. Install enclosed switches plumb.
- F. Except where indicated to be mounted adjacent to the equipment they supply, mount enclosed switches such that the highest position of the operating handle does not exceed 79 inches (2000 mm) above the floor or working platform.
- G. Provide grounding and bonding in accordance with Section 26 0526.
- H. Provide fuses complying with Section 26 2813 for fusible switches as indicated or as required by equipment manufacturer's recommendations.
- I. Identify enclosed switches in accordance with Section 26 0553.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Perform inspections and tests listed in NETA ATS, Section 7.5.1.1.
- D. Correct deficiencies and replace damaged or defective enclosed safety switches or associated components.

3.04 ADJUSTING

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

3.05 CLEANING

- A. Clean dirt and debris from switch enclosures and components according to manufacturer's instructions.
- B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION 26 2816.16

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**SECTION 26 2913
ENCLOSED CONTROLLERS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Enclosed NEMA controllers for low-voltage (600 V and less) applications:
 - 1. Magnetic motor starters.
 - 2. General purpose contactors.
 - 3. Manual motor starters.
 - 4. Motor-starting switches without overload protection.
- B. Overcurrent protective devices for motor controllers, including overload relays.
- C. Control accessories:
 - 1. Auxiliary contacts.
 - 2. Pilot devices.
 - 3. Control and timing relays.
 - 4. Control power transformers.
 - 5. Control terminal blocks.

1.02 RELATED REQUIREMENTS

- A. Section 26 0526 - Grounding and Bonding for Electrical Systems.
- B. Section 26 0529 - Hangers and Supports for Electrical Systems.
- C. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- D. Section 26 0573 - Power System Studies: Additional criteria for the selection and adjustment of equipment and associated protective devices specified in this section.
- E. Section 26 2813 - Fuses: Fuses for fusible switches.

1.03 REFERENCE STANDARDS

- A. IEEE C57.13 - IEEE Standard Requirements for Instrument Transformers; 2016.
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.
- D. NEMA ICS 2 - Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts; 2000 (R2005), with errata, 2008.
- E. NEMA ICS 5 - Industrial Control and Systems: Control Circuit and Pilot Devices; 2000 (R2010).
- F. NEMA ICS 6 - Industrial Control and Systems: Enclosures; 1993 (R2011).
- G. NEMA KS 1 - Heavy Duty Enclosed and Dead-Front Switches (600 Volts Maximum); 2013.
- H. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2013.
- I. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- J. UL 98 - Enclosed and Dead-Front Switches; Current Edition, Including All Revisions.
- K. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures; Current Edition, Including All Revisions.
- L. UL 60947-1 - Low-Voltage Switchgear and Controlgear - Part 1: General Rules; Current Edition, Including All Revisions.
- M. UL 60947-4-1 - Low-Voltage Switchgear and Controlgear - Part 4-1: Contactors and Motor-starters - Electromechanical Contactors and Motor-starters; Current Edition, Including All Revisions.

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1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances required by NFPA 70.
 - 2. Coordinate the work to provide motor controllers and associated overload relays suitable for use with the actual motors to be installed.
 - 3. Coordinate the work to provide controllers and associated wiring suitable for interface with control devices to be installed.
 - 4. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 5. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
 - 6. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for motor controllers, enclosures, overcurrent protective devices, and other installed components and accessories.
- C. Shop Drawings: Indicate dimensions, voltage, controller sizes, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.
 - 1. Include dimensioned plan and elevation views of enclosed controllers and adjacent equipment with all required clearances indicated.
 - 2. Include wiring diagrams showing all factory and field connections.
- D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- E. Project Record Documents: Record actual installed locations of controllers and final equipment settings.

1.06 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- B. Handle carefully in accordance with manufacturer's written instructions to avoid damage to internal components, enclosure, and finish.

1.08 FIELD CONDITIONS

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

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. ABB/GE; _____: www.geindustrial.com/#sle.
- B. Eaton Corporation; _____: www.eaton.com/#sle.

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- C. Rockwell Automation, Inc; Allen-Bradley Products; _____: ab.rockwellautomation.com/#sle.
- D. Schneider Electric; Square D Products; _____: www.schneider-electric.us/#sle.
- E. Siemens Industry, Inc; _____: www.usa.siemens.com/#sle.
- F. Substitutions: See Section 01 6000 - Product Requirements.
- G. Source Limitations: Furnish enclosed motor controllers and associated components produced by a single manufacturer and obtained from a single supplier.
 - 1. Motor-starting switches without overload protection may be produced by the same manufacturer as the wiring devices used for this project.

2.02 ENCLOSED CONTROLLERS

- A. Provide enclosed controller assemblies consisting of all required components, control power transformers, instrumentation and control wiring, accessories, etc. as necessary for a complete operating system.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Description: Enclosed controllers complying with NEMA ICS 2, and listed and labeled as complying with UL 60947-1 and UL 60947-4-1; ratings, configurations and features as indicated on the drawings.
- D. Service Conditions:
 - 1. Provide controllers and associated components suitable for operation under the following service conditions without derating:
 - a. Altitude:
 - 1) Class 1 Km Equipment (devices utilizing power semiconductors, e.g. variable frequency controllers): Less than 3,300 feet (1,000 m).
 - 2) Class 2 Km Equipment (electromagnetic and manual devices): Less than 6,600 feet (2,000 m).
 - b. Ambient Temperature: Between 32 degrees F (0 degrees C) and 104 degrees F (40 degrees C).
 - 2. Provide controllers and associated components suitable for operation at indicated ratings under the service conditions at the installed location.
- E. Short Circuit Current Rating:
 - 1. Provide controllers with listed short circuit current rating not less than the available fault current at the installed location as determined by short circuit study performed in accordance with Section 26 0573.
- F. Conductor Terminations: Suitable for use with the conductors to be installed.
- G. Enclosures:
 - 1. Comply with NEMA ICS 6.
 - 2. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
 - a. Indoor Clean, Dry Locations: Type 1 or Type 12.
 - b. Outdoor Locations: Type 3R or Type 4.
 - c. Hazardous (Classified) Locations: Type 7/9, as required for the classification of the installed location.
 - 3. Finish: Manufacturer's standard unless otherwise indicated.
- H. Instrument Transformers:
 - 1. Comply with IEEE C57.13.
 - 2. Select suitable ratio, burden, and accuracy as required for connected devices.
 - 3. Current Transformers: Connect secondaries to shorting terminal blocks.
 - 4. Potential Transformers: Include primary and secondary fuses with disconnecting means.
- I. Magnetic Motor Starters: Combination type unless otherwise indicated.

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1. Combination Magnetic Motor Starters: NEMA ICS 2, Class A combination motor controllers with magnetic contactor(s), externally operable disconnect and overload relay(s).
 2. Noncombination Magnetic Motor Starters: NEMA ICS 2, Class A noncombination motor controllers with magnetic contactor(s) and overload relay(s).
 3. Configuration: Full-voltage non-reversing unless otherwise indicated.
 4. Disconnects: Circuit breaker type.
 - a. Circuit Breakers: Motor circuit protectors (magnetic-only) unless otherwise indicated or required.
 - b. Provide externally operable handle with means for locking in the OFF position. Provide safety interlock to prevent opening the cover with the disconnect in the ON position with capability of overriding interlock for testing purposes.
 - c. Provide auxiliary interlock for disconnection of external control power sources where applicable.
 5. Overload Relays: Bimetallic thermal type unless otherwise indicated.
 6. Pilot Devices Required:
 - a. Furnish local pilot devices for each unit as specified below unless otherwise indicated on drawings.
 - b. Single-Speed, Non-Reversing Starters:
 - 1) Selector Switches: HAND/OFF/AUTO.
 - 2) Indicating Lights: Red ON, Green OFF.
- J. Manual Motor Starters:
1. Description: NEMA ICS 2, Class A manually-operated motor controllers with overload relay(s).
 2. Configuration: Non-reversing unless otherwise indicated.
 3. Fractional-Horsepower Manual Motor Starters:
 - a. Furnish with toggle operator.
 - b. Overload Relays: Bimetallic or melting alloy thermal type.
 - c. Provide means for locking operator in the OFF position.
 4. Integral-Horsepower Manual Motor Starters:
 - a. Furnish with toggle or pushbutton operator.
 - b. Overload Relays: Bimetallic or melting alloy thermal type.
- K. Motor-Starting Switches: Horsepower-rated switches without overload protection; toggle operator.

2.03 OVERCURRENT PROTECTIVE DEVICES

- A. Overload Relays:
1. Provide overload relays and, where applicable, associated current elements/heaters, selected according to actual installed motor nameplate data, in accordance with manufacturer's recommendations and NFPA 70; include consideration for motor service factor and ambient temperature correction, where applicable.
 2. Inverse-Time Trip Class Rating: Class 20 unless otherwise indicated or required.
 3. Trip-free operation.
 4. Visible trip indication.
 5. Resettable.
 - a. Employ manual reset unless otherwise indicated.
 - b. Do not employ automatic reset with two-wire control.
 6. Bimetallic Thermal Overload Relays:
 - a. Interchangeable current elements/heaters.
 - b. Adjustable trip; plus/minus 10 percent of nominal, minimum.
 - c. Trip test function.
 7. Melting Alloy Thermal Overload Relays:
 - a. Interchangeable current elements/heaters.
- B. Fusible Disconnect Switches:

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1. Description: Quick-make, quick-break, dead-front fusible switch units complying with NEMA KS 1, and listed and labeled as complying with UL 98; ratings, configurations, and features as indicated on the drawings.
 2. Fuse Clips: As required to accept indicated fuses.
 3. Provide externally operable handle with means for locking in the OFF position. Provide means for locking switch cover in the closed position. Provide safety interlock to prevent opening the cover with the switch in the ON position with capability of overriding interlock for testing purposes.
- C. Circuit Breakers:
1. Interrupting Capacity (not applicable to motor circuit protectors):
 - a. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated, but not less than specified minimum requirements.
 - b. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.
 2. Motor Circuit Protectors:
 - a. Description: Instantaneous-trip circuit breakers furnished with magnetic instantaneous tripping elements for short circuit protection, but not with thermal inverse time tripping elements for overload protection; UL 489 recognized only for use as part of a listed combination motor controller with overload protection; ratings, configurations, and features as indicated on the drawings.
 - b. Provide field-adjustable magnetic instantaneous trip setting.
 3. Molded Case Circuit Breakers:
 - a. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers; listed and labeled as complying with UL 489; ratings, configurations, and features as indicated on the drawings.
 - 1) Provide thermal magnetic circuit breakers unless otherwise indicated.
 - b. Thermal Magnetic Circuit Breakers: For each pole, furnish thermal inverse time tripping element for overload protection and magnetic instantaneous tripping element for short circuit protection.

2.04 CONTROL ACCESSORIES

- A. Auxiliary Contacts:
1. Comply with NEMA ICS 5.
 2. Provide number and type of contacts indicated or required to perform necessary functions, including holding (seal-in) circuit and interlocking, plus one normally open (NO) and one normally closed (NC) spare contact for each magnetic motor starter, minimum.
- B. Pilot Devices:
1. Comply with NEMA ICS 5; heavy-duty type.
 2. Pushbuttons: Unless otherwise indicated, provide momentary, non-illuminated type with flush button operator; normally open or normally closed as indicated or as required.
 3. Selector Switches: Unless otherwise indicated, provide maintained, non-illuminated type with knob operator; number of switch positions as indicated or as required.
 4. Indicating Lights: Push-to-test type unless otherwise indicated.
 5. Provide LED lamp source for indicating lights and illuminated devices.
- C. Control and Timing Relays:
1. Comply with NEMA ICS 5.
 2. Provide number and type of relays indicated or required to perform necessary functions.
 3. Timing Relays: Electronic or pneumatic as indicated.
 - a. Adjustable Timing Range: As indicated on drawings.
- D. Control Power Transformers:
1. Size to accommodate burden of contactor coil(s) and all connected auxiliary devices, plus _____ VA spare capacity.
 2. Include primary and secondary fuses.

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PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that ratings of enclosed controllers are consistent with the indicated requirements.
- C. Verify that mounting surfaces are ready to receive enclosed controllers.
- D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install controllers in accordance with NECA 1 (general workmanship).
- C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D. Provide required support and attachment in accordance with Section 26 0529.
- E. Install enclosed controllers plumb and level.
- F. Provide grounding and bonding in accordance with Section 26 0526.
- G. Install all field-installed devices, components, and accessories.
- H. Provide fuses complying with Section 26 2813 for fusible switches as indicated.
- I. Where accessories are not self-powered, provide control power source as indicated or as required to complete installation.
- J. Set field-adjustable controllers and associated components according to installed motor requirements, in accordance with manufacturer's recommendations and NFPA 70.
- K. Identify enclosed controllers in accordance with Section 26 0553.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Motor Starters: Perform inspections and tests listed in NETA ATS, Section 7.16.1.1. Tests listed as optional are not required.
- D. Fusible Switches: Perform inspections and tests listed in NETA ATS, Section 7.5.1.1.
- E. Molded Case Circuit Breakers: Perform inspections and tests listed in NETA ATS, Section 7.6.1.1 for circuit breakers larger than _____ amperes. Tests listed as optional are not required.
- F. Correct deficiencies and replace damaged or defective enclosed controllers or associated components.

3.04 ADJUSTING

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

3.05 CLEANING

- A. Clean dirt and debris from controller enclosures and components according to manufacturer's instructions.
- B. Repair scratched or marred exterior surfaces to match original factory finish.

3.06 CLOSEOUT ACTIVITIES

- A. See Section 01 7800 - Closeout Submittals, for closeout submittals.
- B. See Section 01 7900 - Demonstration and Training, for additional requirements.
- C. Demonstration: Demonstrate proper operation of controllers to Owner, and correct deficiencies or make adjustments as directed.

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- D. Training: Train Owner's personnel on operation, adjustment, and maintenance of enclosed controllers and associated devices.
 - 1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.

3.07 PROTECTION

- A. Protect installed enclosed controllers from subsequent construction operations.

END OF SECTION 26 2913

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**SECTION 26 2923
VARIABLE-FREQUENCY MOTOR CONTROLLERS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Variable frequency controllers. Drives to be sized for single phase to three phase conversion.

1.02 RELATED REQUIREMENTS

- A. Section 26 0529 - Hangers and Supports for Electrical Systems.
- B. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- C. Section 26 2813 - Fuses.

1.03 REFERENCE STANDARDS

- A. NEMA ICS 7.1 - Safety Standards for Construction and Guide for Selection, Installation, and Operation of Adjustable-Speed Drive Systems; 2014.
- B. NEMA ICS 7 - Industrial Control and Systems: Adjustable-Speed Drives; 2014.
- C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.
- D. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2013.
- E. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide catalog sheets showing voltage, controller size, ratings and size of switching and overcurrent protective devices, short circuit ratings, dimensions, and enclosure details.
- C. Shop Drawings: Indicate front and side views of enclosures with overall dimensions and weights shown; conduit entrance locations and requirements; and nameplate legends. Provide wiring diagrams specific to the the equipment being connected to controller.
- D. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- E. Operation Data: NEMA ICS 7.1. Include instructions for starting and operating controllers, and describe operating limits that may result in hazardous or unsafe conditions.
- F. Maintenance Data: NEMA ICS 7.1. Include routine preventive maintenance schedule.

1.05 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Products: Listed, classified, and labeled as suitable for the purpose intended.
- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- B. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to components, enclosure, and finish.

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PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Variable Frequency Motor Controllers:
 - 1. ABB/GE: www.geindustrial.com/#sle.
 - 2. Danfoss: www.danfoss.com/#sle.
 - 3. Eaton Corporation: www.eaton.com/#sle.
 - 4. Rockwell Automation, Inc.; Allen-Bradley Products: ab.rockwellautomation.com/#sle.
 - 5. Schneider Electric; Square D Products: www.schneider-electric.us/#sle.
 - 6. Siemens Industry, Inc: www.usa.siemens.com/#sle.
- B. Substitutions: See Section 01 6000 - Product Requirements.
- C. Source Limitations: Furnish variable frequency motor controllers and associated components produced by a single manufacturer and obtained from a single supplier.

2.02 DESCRIPTION

- A. Variable Frequency Controllers: Enclosed controllers suitable for operating the indicated loads, in conformance with requirements of NEMA ICS 7. Select unspecified features and options in accordance with NEMA ICS 3.1.
 - 1. Employ microprocessor-based inverter logic isolated from power circuits.
 - 2. Employ pulse-width-modulated inverter system.
 - 3. Design for ability to operate controller with motor disconnected from output.
 - 4. Design to attempt five automatic restarts following fault condition before locking out and requiring manual restart.
- B. Enclosures: NEMA 250, Type 1, suitable for equipment application in places regularly open to the public.
- C. Finish: Manufacturer's standard enamel.

2.03 OPERATING REQUIREMENTS

- A. Rated Input Voltage: 480 volts, three phase, 60 Hertz.
- B. Motor Nameplate Voltage: 460 volts, three phase, 60 Hertz.
- C. Displacement Power Factor: Between 1.0 and 0.95, lagging, over entire range of operating speed and load.
- D. Operating Ambient: 0 degrees C to 40 degrees C.
- E. Volts Per Hertz Adjustment: Plus or minus 10 percent.
- F. Current Limit Adjustment: 60 to 110 percent of rated.
- G. Acceleration Rate Adjustment: 0.5 to 30 seconds.
- H. Deceleration Rate Adjustment: 1 to 30 seconds.
- I. Input Signal: 4 to 20 mA DC.

2.04 COMPONENTS

- A. Display: Provide integral digital display to indicate output voltage, output frequency, and output current.
- B. Status Indicators: Separate indicators for overcurrent, overvoltage, ground fault, overtemperature, and input power ON.
- C. Furnish HAND-OFF-AUTOMATIC selector switch and manual speed control.
- D. Include undervoltage release.
- E. Door Interlocks: Furnish mechanical means to prevent opening of equipment with power connected, or to disconnect power if door is opened; include means for defeating interlock by qualified persons.

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- F. Safety Interlocks: Furnish terminals for remote contact to inhibit starting under both manual and automatic mode.
- G. Control Interlocks: Furnish terminals for remote contact to allow starting in automatic mode.
- H. Manual Bypass (where indicated on drawings): Furnish contactor, motor running overload protection, and short circuit protection for full voltage, non-reversing operation of the motor. Include isolation switch to allow maintenance of inverter during bypass operation.
- I. Emergency Stop: Use dynamic brakes for emergency stop function.
- J. Disconnecting Means: Include integral fused disconnect switch on the line side of each controller.
- K. Wiring Terminations: Match conductor materials and sizes indicated.

2.05 SOURCE QUALITY CONTROL

- A. Shop inspect and perform standard productions tests for each controller.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surface is suitable for controller installation.
- B. Do not install controller until building environment can be maintained within the service conditions required by the manufacturer.
- C. Verify that field measurements are as indicated on shop drawings.

3.02 INSTALLATION

- A. Install in accordance with NEMA ICS 7.1 and manufacturer's instructions.
- B. Provide required support and attachment in accordance with Section 26 0529.
- C. Tighten accessible connections and mechanical fasteners after placing controller.
- D. Provide fuses in fusible switches; refer to Section 26 2813 for product requirements.
- E. Select and install overload heater elements in motor controllers to match installed motor characteristics.
- F. Identify variable frequency controllers in accordance with Section 26 0553.

3.03 FIELD QUALITY CONTROL

- A. Provide the service of the manufacturer's field representative to prepare and start controllers.
- B. Perform field inspection and testing in accordance with Section 01 4000.
- C. Inspect and test in accordance with NETA ATS, except Section 4.
- D. Perform inspections and tests listed in NETA ATS, Section 7.17. The insulation-resistance test on control wiring listed as optional is not required.

3.04 ADJUSTING

- A. Make final adjustments to installed controller to assure proper operation of load system. Obtain performance requirements from installer of driven loads.

3.05 CLOSEOUT ACTIVITIES

- A. Demonstrate operation of controllers in automatic and manual modes.

3.06 MAINTENANCE

- A. See Section 01 7000 - Execution Requirements, for additional requirements relating to maintenance service.

END OF SECTION 26 2923

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**SECTION 26 3213
ENGINE GENERATORS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Packaged engine generator system and associated components and accessories:
 - 1. Engine and engine accessory equipment.
 - 2. Alternator (generator).
 - 3. Generator set control system.
 - 4. Generator set enclosure.

1.02 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete: Concrete equipment pads.
- B. Section 23 1126 - Facility Liquefied-Petroleum Gas Piping.
- C. Section 26 0526 - Grounding and Bonding for Electrical Systems.
- D. Section 26 0529 - Hangers and Supports for Electrical Systems.
- E. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- F. Section 26 3600 - Transfer Switches.

1.03 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- B. NECA/EGSA 404 - Standard for Installing Generator Sets; 2014.
- C. NEMA MG 1 - Motors and Generators; 2018.
- D. NFPA 30 - Flammable and Combustible Liquids Code; 2018.
- E. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. NFPA 110 - Standard for Emergency and Standby Power Systems; 2016.
- G. UL 1236 - Battery Chargers for Charging Engine-Starter Batteries; Current Edition, Including All Revisions.
- H. UL 2200 - Stationary Engine Generator Assemblies; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate compatibility of generator sets to be installed with work provided under other sections or by others.
 - a. Transfer Switches: See Section 26 3600.
 - 2. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment or other potential obstructions within the spaces dedicated for engine generator system.
 - 3. Coordinate arrangement of equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 4. Coordinate the work to provide electrical circuits suitable for the power requirements of the actual auxiliary equipment and accessories to be installed.
 - 5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product, including ratings, configurations, dimensions, finishes, weights, service condition requirements, and installed features. Include alternator starting capabilities, engine fuel consumption rates, and cooling, combustion air, and exhaust requirements.

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1. Include generator set sound level test data.
 2. Include characteristic trip curves for overcurrent protective devices upon request.
 3. Include alternator thermal damage curve upon request.
- C. Shop Drawings: Include dimensioned plan views and sections indicating locations of system components, required clearances, and field connection locations. Include system interconnection schematic diagrams showing all factory and field connections.
- D. Derating Calculations: Indicate ratings adjusted for applicable service conditions.
- E. Fuel Storage Tank Calculations: Indicate maximum running time for generator set configuration provided.
- F. Specimen Warranty: Submit sample of manufacturer's warranty.
- G. Evidence of qualifications for installer.
- H. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and operation of product.
- I. Manufacturer's factory emissions certification.
- J. Manufacturer's certification that products meet or exceed specified requirements.
- K. Source quality control test reports.
- L. Provide NFPA 110 required documentation from manufacturer where requested by authorities having jurisdiction, including but not limited to:
 1. Certified prototype tests.
 2. Torsional vibration compatibility certification.
 3. NFPA 110 compliance certification.
 4. Certified rated load test at rated power factor.
- M. Manufacturer's detailed field testing procedures.
- N. Field quality control test reports.
- O. Operation and Maintenance Data: Include detailed information on system operation, equipment programming and setup, replacement parts, and recommended maintenance procedures and intervals.
 1. Include contact information for entity that will be providing contract maintenance and trouble call-back service.
- P. Maintenance contracts.
- Q. Project Record Documents: Record actual locations of system components, installed circuiting arrangements and routing, and final equipment settings.
- R. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 1. See Section 01 6000 - Product Requirements, for additional provisions.
 2. Extra Fuses: One of each type and size.
 3. Extra Filter Elements: One of each type, including fuel, oil and air.

1.06 QUALITY ASSURANCE

- A. Comply with the following:
 1. NFPA 70 (National Electrical Code).
 2. NFPA 110 (Standard for Emergency and Standby Power Systems); meet requirements for Level 1 system.
 3. NFPA 30 (Flammable and Combustible Liquids Code).
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
 1. Authorized service facilities located within 200 miles (320 km) of project site.

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- C. Installer Qualifications: Company specializing in performing the work of this section with minimum three years documented experience with engine generator systems of similar size, type, and complexity; manufacturer's authorized installer.
- D. Maintenance Contractor Qualifications: Same entity as installer or different entity with specified qualifications.
 - 1. Contract maintenance office located within 200 miles (320 km) of project site.
- E. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store generator sets in accordance with manufacturer's instructions and NECA/EGSA 404.
- B. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- C. Handle carefully in accordance with manufacturer's instructions to avoid damage to generator set components, enclosure, and finish.

1.08 FIELD CONDITIONS

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

1.09 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Provide minimum one year manufacturer warranty covering repair or replacement due to defective materials or workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Packaged Engine Generator Set:
 - 1. Caterpillar Inc: www.cat.com.
 - 2. Cummins Power Generation Inc: www.cumminspower.com.
 - 3. Generac Power Systems: www.generac.com/industrial.
 - 4. Kohler Co: www.kohlerpower.com.
- B. Substitutions: See Section 01 6000 - Product Requirements.
- C. Source Limitations: Furnish engine generator sets and associated components and accessories produced by a single manufacturer and obtained from a single supplier.

2.02 PACKAGED ENGINE GENERATOR SYSTEM

- A. Provide new engine generator system consisting of all required equipment, sensors, conduit, boxes, wiring, piping, supports, accessories, system programming, etc. as necessary for a complete operating system that provides the functional intent indicated.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. System Description:
 - 1. Application: Emergency/standby.
 - 2. Configuration: Single packaged engine generator set operated independently (not in parallel).
 - 3. Total System Power Rating: As indicated on drawings, standby.
- D. Packaged Engine Generator Set:
 - 1. Type: Gaseous (spark ignition).
 - 2. Power Rating: As indicated on drawings, standby.
 - 3. Voltage: As indicated on drawings.
 - 4. Main Line Circuit Breaker:

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- a. Type: Thermal magnetic.
 - b. Trip Rating: Select according to generator set rating.
- E. Generator Set General Requirements:
- 1. Prototype tested in accordance with NFPA 110 for Level 1 systems.
 - 2. Factory-assembled, with components mounted on suitable base.
 - 3. List and label engine generator assembly as complying with UL 2200.
 - 4. Power Factor: Unless otherwise indicated, specified power ratings are at 0.8 power factor for three phase voltages and 1.0 power factor for single phase voltages.
 - 5. Provide suitable guards to protect personnel from accidental contact with rotating parts, hot piping, and other potential sources of injury.
 - 6. Main Line Circuit Breakers: Provide factory-installed line side connections with suitable lugs for load side connections.
- F. Service Conditions: Provide engine generator system and associated components suitable for operation under the service conditions at the installed location.
- G. Starting and Load Acceptance Requirements:
- 1. Cranking Method: Cycle cranking complying with NFPA 110 (15 second crank period, followed by 15 second rest period, with cranking limiter time-out after 3 cycles), unless otherwise required.
 - 2. Cranking Limiter Time-Out: If generator set fails to start after specified cranking period, indicate overcrank alarm condition and lock-out generator set from further cranking until manually reset.
 - 3. Start Time: Capable of starting and achieving conditions necessary for load acceptance within 10 seconds (NFPA 110, Type 10).
 - 4. Maximum Load Step: Supports 100 percent of rated load in one step.
- H. Exhaust Emissions Requirements:
- 1. Comply with federal (EPA), state, and local regulations applicable at the time of commissioning; include factory emissions certification with submittals.
 - 2. Do not make modifications affecting generator set factory emissions certification without approval of manufacturer and Engineer. Where such modifications are made, provide field emissions testing as necessary for certification.
- I. Sound Level Requirements:
- 1. Do not exceed _____ dBA when measured at 23 feet (7 m) from generator set in free field (no sound barriers) while operating at full load; include manufacturer's sound data with submittals.
 - 2. Comply with applicable noise level regulations.
- J. Interface with building automation system.

2.03 ENGINE AND ENGINE ACCESSORY EQUIPMENT

- A. Provide engine with adequate horsepower to achieve specified power output at rated speed, accounting for alternator efficiency and parasitic loads.
- B. Engine Fuel System - Gaseous (Spark Ignition):
- 1. Fuel Source: Propane (LP), vapor withdrawal.
 - 2. Engine Fuel Connections: Provide suitable, approved flexible fuel lines for coupling engine to fuel source.
 - 3. Provide components/features indicated and as necessary for operation and/or required by applicable codes, including but not limited to:
 - a. Carburetor.
 - b. Gas pressure regulators.
 - c. Fuel shutoff control valves.
 - d. Low gas pressure switches.
- C. Engine Starting System:
- 1. System Type: Electric, with DC solenoid-activated starting motor(s).
 - 2. Battery(s):

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- a. Battery Type: Lead-acid.
 - b. Battery Capacity: Size according to manufacturer's recommendations for achieving starting and load acceptance requirements under worst case ambient temperature; capable of providing cranking through two complete periods of cranking limiter time-outs without recharging.
 - c. Provide battery rack, cables, and connectors suitable for the supplied battery(s); size battery cables according to manufacturer's recommendations for cable length to be installed.
3. Battery-Charging Alternator: Engine-driven, with integral solid-state voltage regulation.
4. Battery Charger:
- a. Provide dual rate battery charger with automatic float and equalize charging modes and minimum rating of 10 amps; suitable for maintaining the supplied battery(s) at full charge without manual intervention.
 - b. Capable of returning supplied battery(s) from fully discharged to fully charged condition within 24 hours, as required by NFPA 110 for Level 1 applications while carrying normal loads.
 - c. Recognized as complying with UL 1236.
 - d. Furnished with integral overcurrent protection; current limited to protect charger during engine cranking; reverse polarity protection.
 - e. Provide integral DC output ammeter and voltmeter with five percent accuracy.
 - f. Provide alarm output contacts as necessary for alarm indications.
5. Battery Heater: Provide thermostatically controlled battery heater to improve starting under cold ambient conditions.
- D. Engine Speed Control System (Governor):
- 1. Single Engine Generator Sets (Not Operated in Parallel): Provide electronic isochronous governor for controlling engine speed/alternator frequency.
 - 2. Frequency Regulation, Electronic Isochronous Governors: No change in frequency from no load to full load; plus/minus 0.25 percent at steady state.
- E. Engine Lubrication System:
- 1. System Type: Full pressure, with engine-driven, positive displacement lubrication oil pump, replaceable full-flow oil filter(s), and dip-stick for oil level indication. Provide oil cooler where recommended by manufacturer.
 - 2. Oil Heater: Provide thermostatically controlled oil heater to improve starting under cold ambient conditions.
- F. Engine Cooling System:
- 1. System Type: Closed-loop, liquid-cooled, with unit-mounted radiator/fan and engine-driven coolant pump; suitable for providing adequate cooling while operating at full load under worst case ambient temperature.
 - 2. Fan Guard: Provide suitable guard to protect personnel from accidental contact with fan.
 - 3. Coolant Heater: Provide thermostatically controlled coolant heater to improve starting under cold ambient conditions; size according to manufacturer's recommendations for achieving starting and load acceptance requirements under worst case ambient temperature.
- G. Engine Air Intake and Exhaust System:
- 1. Air Intake Filtration: Provide engine-mounted, replaceable, dry element filter.
 - 2. Engine Exhaust Connection: Provide suitable, approved flexible connector for coupling engine to exhaust system.
 - 3. Exhaust Silencer: Provide critical grade or better exhaust silencer with sound attenuation not less than basis of design; select according to manufacturer's recommendations to meet sound performance requirements, where specified.

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2.04 ALTERNATOR (GENERATOR)

- A. Alternator: 4-pole, 1800 rpm (60 Hz output) revolving field, synchronous generator complying with NEMA MG 1; connected to engine with flexible coupling; voltage output configuration as indicated, with reconnectable leads for 3 phase alternators.
- B. Exciter:
 - 1. Exciter Type: Brushless; provide permanent magnet generator (PMG) excitation system; self-excited (shunt) systems are not permitted.
 - 2. PMG Excitation Short-Circuit Current Support: Capable of sustaining 300 percent of rated output current for 10 seconds.
 - 3. Voltage Regulation (with PMG excitation): Plus/minus 0.5 percent for any constant load from no load to full load.
- C. Temperature Rise: Comply with UL 2200.
- D. Insulation System: NEMA MG 1, Class H; suitable for alternator temperature rise.
- E. Enclosure: NEMA MG 1, drip-proof.
- F. Total Harmonic Distortion: Not greater than five percent.
- G. Alternator Heater: Provide strip heater to prevent moisture condensation on alternator windings.

2.05 GENERATOR SET CONTROL SYSTEM

- A. Provide microprocessor-based control system for automatic control, monitoring, and protection of generator set. Include sensors, wiring, and connections necessary for functions/indications specified.
- B. Control Panel:
 - 1. Control Panel Mounting: Unit-mounted unless otherwise indicated; vibration isolated.
 - 2. Generator Set Control Functions:
 - a. Automatic Mode: Initiates generator set start/shutdown upon receiving corresponding signal from remote device (e.g. automatic transfer switch).
 - b. Manual Mode: Initiates generator set start/shutdown upon direction from operator.
 - c. Reset Mode: Clears all faults, allowing generator set restart after a shutdown.
 - d. Emergency Stop: Immediately shuts down generator set (without time delay) and prevents automatic restarting until manually reset.
 - e. Cycle Cranking: Programmable crank time, rest time, and number of cycles.
 - f. Time Delay: Programmable for shutdown (engine cooldown) and start (engine warmup).
 - g. Voltage Adjustment: Adjustable through range of plus/minus 5 percent.
 - 3. Generator Set Status Indications:
 - a. Voltage (Volts AC): Line-to-line, line-to-neutral for each phase.
 - b. Current (Amps): For each phase.
 - c. Frequency (Hz).
 - d. Real power (W/kW).
 - e. Reactive power (VAR/kVAR).
 - f. Apparent power (VA/kVA).
 - g. Power factor.
 - h. Duty Level: Actual load as percentage of rated power.
 - i. Engine speed (RPM).
 - j. Battery voltage (Volts DC).
 - k. Engine oil pressure.
 - l. Engine coolant temperature.
 - m. Engine run time.
 - n. Generator powering load (position signal from transfer switch).
 - 4. Generator Set Protection and Warning/Shutdown Indications:

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- a. Comply with NFPA 110; configurable for NFPA 110 Level 1 or Level 2, or NFPA 99 systems including but not limited to the following protections/indications:
 - 1) Overcrank (shutdown).
 - 2) Low coolant temperature (warning).
 - 3) High coolant temperature (warning).
 - 4) High coolant temperature (shutdown).
 - 5) Low oil pressure (shutdown).
 - 6) Overspeed (shutdown).
 - 7) Low fuel level (warning).
 - 8) Low coolant level (warning/shutdown).
 - 9) Generator control not in automatic mode (warning).
 - 10) High battery voltage (warning).
 - 11) Low cranking voltage (warning).
 - 12) Low battery voltage (warning).
 - 13) Battery charger failure (warning).
 - b. In addition to NFPA 110 requirements, provide the following protections/indications:
 - 1) High AC voltage (shutdown).
 - 2) Low AC voltage (shutdown).
 - 3) High frequency (shutdown).
 - 4) Low frequency (shutdown).
 - 5) Overcurrent (shutdown).
 - 6) Fuel tank leak (warning), where applicable.
 - c. Provide contacts for local and remote common alarm.
 - d. Provide lamp test function that illuminates all indicator lamps.
5. Other Control Panel Features:
- a. Event log.
- C. Remote Annunciator:
- 1. Remote Annunciator Mounting: Wall-mounted; Provide flush-mounted annunciator for finished areas and surface-mounted annunciator for non-finished areas unless otherwise indicated.
 - 2. Generator Set Status Indications:
 - a. Generator powering load (via position signal from transfer switch).
 - b. Communication functional.
 - 3. Generator Set Warning/Shutdown Indications:
 - a. Comply with NFPA 110 for Level 1 systems including but not limited to the following indications:
 - 1) Overcrank (shutdown).
 - 2) Low coolant temperature (warning).
 - 3) High coolant temperature (warning).
 - 4) High coolant temperature (shutdown).
 - 5) Low oil pressure (shutdown).
 - 6) Overspeed (shutdown).
 - 7) Low fuel level (warning).
 - 8) Low coolant level (warning/shutdown).
 - 9) Generator control not in automatic mode (warning).
 - 10) High battery voltage (warning).
 - 11) Low cranking voltage (warning).
 - 12) Low battery voltage (warning).
 - 13) Battery charger failure (warning).
 - b. Provide audible alarm with silence function.
 - c. Provide lamp test function that illuminates all indicator lamps.
- D. Remote Emergency Stop: Provide approved red, mushroom style remote emergency stop button where indicated or required by authorities having jurisdiction.

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2.06 GENERATOR SET ENCLOSURE

- A. Enclosure Type: Sound attenuating, weather protective.
- B. Enclosure Material: Steel or aluminum.
- C. Hardware Material: Stainless steel.
- D. Color: Manufacturer's standard.
- E. Access Doors: Lockable, with all locks keyed alike.
- F. Openings: Designed to prevent bird/rodent entry.
- G. External Drains: Extend oil and coolant drain lines to exterior of enclosure for maintenance service.
- H. Sound Attenuating Enclosures: Line enclosure with non-hygroscopic, self-extinguishing sound-attenuating material.
- I. Utilize an upward discharging radiator hood.
- J. Exhaust Silencers: Where exhaust silencers are mounted within enclosure in main engine compartment, insulate silencer to minimize heat dissipation as necessary for operation at rated load under worst case ambient temperature.
- K. Enclosure Space Heater: Provide thermostatically controlled enclosure space heater to prevent condensation and improve starting under cold ambient conditions; size according to manufacturer's recommendations for achieving starting and load acceptance requirements under worst case ambient temperature.

2.07 SOURCE QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Perform production tests on generator sets at factory to verify operation and performance characteristics prior to shipment. Include certified test report with submittals.
- C. Generator Set production testing to include, at a minimum:
 - 1. Operation at rated load and rated power factor.
 - 2. Single step load pick-up.
 - 3. Transient and steady state voltage and frequency performance.
 - 4. Operation of safety shutdowns.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that the ratings and configurations of generator sets and auxiliary equipment are consistent with the indicated requirements.
- C. Verify that rough-ins for field connections are in the proper locations.
- D. Verify that mounting surfaces are ready to receive equipment.
- E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship).
- B. Install products in accordance with manufacturer's instructions.
- C. Install generator sets and associated accessories in accordance with NECA/EGSA 404.
- D. Arrange equipment to provide minimum clearances and required maintenance access.
- E. Unless otherwise indicated, mount generator set on properly sized, minimum 6 inch (150 mm) high concrete pad constructed in accordance with Section 03 3000.
- F. Provide required support and attachment in accordance with Section 26 0529.

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- G. Use manufacturer's recommended oil and coolant, suitable for the worst case ambient temperatures.
- H. Provide propane gas piping in accordance with Section 10 00001.
- I. Provide engine exhaust piping in accordance with Section 23 5100, where not factory installed.
 - 1. Include piping expansion joints, piping insulation, thimble, condensation trap/drain, rain cap, hangers/supports, etc. as indicated or as required.
 - 2. Do not exceed manufacturer's maximum back pressure requirements.
- J. Install exhaust silencer in accordance with Section 23 5100, where not factory installed.
- K. Provide grounding and bonding in accordance with Section 26 0526.
- L. Identify system wiring and components in accordance with Section 26 0553.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Provide services of a manufacturer's authorized representative to prepare and start systems and perform inspection and testing. Include manufacturer's detailed testing procedures and field reports with submittals.
- C. Notify Owner and Architect at least two weeks prior to scheduled inspections and tests.
- D. Notify authorities having jurisdiction and comply with their requirements for scheduling inspections and tests and for observation by their personnel.
- E. Provide all equipment, tools, and supplies required to accomplish inspection and testing, including load bank and fuel.
- F. Preliminary inspection and testing to include, at a minimum:
 - 1. Inspect each system component for damage and defects.
 - 2. Verify tightness of mechanical and electrical connections are according to manufacturer's recommended torque settings.
 - 3. Check for proper oil and coolant levels.
- G. Prepare and start system in accordance with manufacturer's instructions.
- H. Perform acceptance test in accordance with NFPA 110.
- I. Inspection and testing to include, at a minimum:
 - 1. Verify compliance with starting and load acceptance requirements.
 - 2. Verify voltage and frequency; make required adjustments as necessary.
 - 3. Verify phase sequence.
 - 4. Verify control system operation, including safety shutdowns.
 - 5. Verify operation of auxiliary equipment and accessories (e.g. battery charger, heaters, etc.).
 - 6. Perform load tests in accordance with NFPA 110 (1.5 hour building load test followed by 2 hour full load test).
- J. Provide field emissions testing where necessary for certification.
- K. Sound Level Tests: Measure sound levels for compliance with specified requirements. Identify and report ambient noise conditions.
- L. Correct defective work, adjust for proper operation, and retest until entire system complies with Contract Documents.
- M. Submit detailed reports indicating inspection and testing results and corrective actions taken.

3.04 CLEANING

- A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

3.05 CLOSEOUT ACTIVITIES

- A. See Section 01 7800 - Closeout Submittals, for closeout submittals.

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- B. See Section 01 7900 - Demonstration and Training, for additional requirements.
- C. Demonstration: Demonstrate proper operation of system to Owner, and correct deficiencies or make adjustments as directed.
- D. Training: Train Owner's personnel on operation, adjustment, and maintenance of system.
 - 1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
 - 2. Provide minimum of four hours of training.
 - 3. Instructor: Manufacturer's authorized representative.
 - 4. Location: At project site.
- E. After successful acceptance test and just prior to Substantial Completion, replace air, oil, and fuel filters and fill fuel storage tank.

3.06 PROTECTION

- A. Protect installed engine generator system from subsequent construction operations.

3.07 MAINTENANCE

- A. See Section 01 7000 - Execution and Closeout Requirements, for additional requirements relating to maintenance service.
- B. Provide to Owner a proposal as an alternate to the base bid, a separate maintenance contract for the service and maintenance of engine generator system for two years from date of Substantial Completion; Include a complete description of preventive maintenance, systematic examination, adjustment, inspection, and testing, with a detailed schedule.
- C. Provide trouble call-back service upon notification by Owner:
 - 1. Provide on-site response within 4 hours of notification.
 - 2. Include allowance for call-back service during normal working hours at no extra cost to Owner.
 - 3. Owner will pay for call-back service outside of normal working hours on an hourly basis, based on actual time spent at site and not including travel time; include hourly rate and definition of normal working hours in maintenance contract.
- D. Maintain an on-site log listing the date and time of each inspection and call-back visit, the condition of the system, nature of the trouble, correction performed, and parts replaced.

END OF SECTION 26 3213

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**SECTION 26 3600
TRANSFER SWITCHES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Transfer switches for low-voltage (600 V and less) applications and associated accessories:
 - 1. Automatic transfer switches.

1.02 RELATED REQUIREMENTS

- A. Section 26 0526 - Grounding and Bonding for Electrical Systems.
- B. Section 26 0529 - Hangers and Supports for Electrical Systems.
- C. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- D. Section 26 2816.16 - Enclosed Switches: Safety switches not listed for use as transfer switch equipment.
- E. Section 26 3213 - Engine Generators: For interface with transfer switches.
 - 1. Includes code requirements applicable to work of this section.
 - 2. Includes additional testing requirements.
 - 3. Includes related demonstration and training requirements.

1.03 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.
- C. NEMA ICS 10 Part 1 - Industrial Control and Systems Part 1: Electromechanical AC Transfer Switch Equipment; 2005.
- D. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2013.
- E. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. NFPA 110 - Standard for Emergency and Standby Power Systems; 2016.
- G. UL 1008 - Transfer Switch Equipment; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate compatibility of transfer switches to be installed with work provided under other sections or by others.
 - a. Engine Generators: See Section 26 3213.
 - 2. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances required by NFPA 70.
 - 3. Coordinate arrangement of equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 4. Coordinate the work with placement of supports, anchors, etc. required for mounting.
 - 5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product, including ratings, configurations, dimensions, finishes, weights, service condition requirements, and installed features.

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- C. Shop Drawings: Include dimensioned plan views and sections indicating locations of system components, required clearances, and field connection locations. Include system interconnection schematic diagrams showing all factory and field connections.
 - 1. Clearly indicate whether proposed short circuit current ratings are based on testing with specific overcurrent protective devices or time durations; indicate short-time ratings where applicable.
- D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and operation of product.
- E. Manufacturer's certification that products meet or exceed specified requirements.
- F. Source quality control test reports.
- G. Manufacturer's detailed field testing procedures.
- H. Field quality control test reports.
- I. Operation and Maintenance Data: Include detailed information on system operation, equipment programming and setup, replacement parts, and recommended maintenance procedures and intervals.
 - 1. Include contact information for entity that will be providing contract maintenance and trouble call-back service.
- J. Executed Warranty: Submit documentation of final executed warranty completed in Owner's name and registered with manufacturer.
- K. Maintenance contracts.
- L. Project Record Documents: Record actual locations of system components, installed circuiting arrangements and routing, and final equipment settings.
- M. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Bypass/Isolation Transfer Switches: Provide accessories (ramps, dollies, etc.) necessary for removal of drawout components.

1.06 QUALITY ASSURANCE

- A. Comply with the following:
 - 1. NFPA 70 (National Electrical Code).
 - 2. NFPA 110 (Standard for Emergency and Standby Power Systems); meet requirements for Level 2 system.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
 - 1. Authorized service facilities located within 200 miles (320 km) of project site.
- C. Installer Qualifications: Company specializing in performing the work of this section with minimum three years documented experience with power transfer systems of similar size, type, and complexity; manufacturer's authorized installer.
- D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store transfer switches in accordance with manufacturer's instructions.
- B. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- C. Handle carefully in accordance with manufacturer's instructions to avoid damage to transfer switch components, enclosure, and finish.

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1.08 FIELD CONDITIONS

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

1.09 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Provide minimum one year manufacturer warranty covering repair or replacement due to defective materials or workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Transfer Switches:
 - 1. ABB/GE: www.geindustrial.com/#sle.
 - 2. ASCO Power Technologies: www.ascopower.com/#sle.
 - 3. Eaton Corporation: www.eaton.com/#sle.
 - 4. Thomson Power Systems: www.thomsonps.com/#sle.
 - 5. Same as manufacturer of engine generator(s) used for this project.
- B. Substitutions: See Section 01 6000 - Product Requirements.
- C. Products other than basis of design are subject to compliance with specified requirements and prior approval of Engineer. By using products other than basis of design, Contractor accepts responsibility for costs associated with any necessary modifications to related work, including any design fees.

2.02 TRANSFER SWITCHES

- A. Provide complete power transfer system consisting of all required equipment, conduit, boxes, wiring, supports, accessories, system programming, etc. as necessary for a complete operating system that provides the functional intent indicated.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Applications:
 - 1. Utilize open transition transfer unless otherwise indicated or required.
 - 2. For transfer of highly inductive loads (e.g. large motors and transformers), utilize open transition transfer with in-phase monitor.
 - 3. Neutral Switching (Single Phase, Three Wire and Three Phase, Four Wire Systems):
 - a. Unless otherwise indicated or required, provide solid (unswitched) neutral.
 - 4. Provide signal before transfer contacts for transfer switches serving elevators.
- D. Construction Type: Only "contactor type" (open contact) transfer switches are acceptable. Do not use "breaker type" (enclosed contact) transfer switches.
- E. Automatic Transfer Switch:
 - 1. Voltage: As indicated on the drawings.
 - 2. Ampere Rating: as indicated on the drawings.
 - 3. Neutral Configuration: Solid neutral (unswitched), except as indicated.
 - 4. Load Served: As indicated on the drawings.
 - 5. Primary Source: As indicated on the drawings.
 - 6. Alternate Source: As indicated on the drawings.
- F. Comply with NEMA ICS 10 Part 1, and list and label as complying with UL 1008 for the classification of the intended application (e.g. emergency, optional standby).
- G. Do not use double throw safety switches or other equipment not specifically designed for power transfer applications and listed as transfer switch equipment.
- H. Load Classification: Classified for total system load (any combination of motor, electric discharge lamp, resistive, and tungsten lamp loads with tungsten lamp loads not exceeding 30 percent of the continuous current rating) unless otherwise indicated or required.

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- I. Switching Methods:
 - 1. Open Transition:
 - a. Provide break-before-make transfer without a neutral position that is not connected to either source, and with interlocks to prevent simultaneous connection of the load to both sources.
 - b. Where in-phase transfer is indicated, utilize in-phase monitor to initiate transfer when phase angle difference between sources is near zero to limit in-rush currents.
 - 2. Neutral Switching: Either simultaneously switched neutral (break-before-make) or overlapping neutral (make-before-break) methods are acceptable.
 - 3. Obtain control power for transfer operation from line side of source to which the load is to be transferred.
- J. Service Conditions: Provide transfer switches suitable for continuous operation at indicated ratings under the service conditions at the installed location.
- K. Enclosures:
 - 1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
 - a. Indoor Clean, Dry Locations: Type 1 or Type 12.
 - b. Outdoor Locations: Type 3R or Type 4.
 - 2. Provide lockable door(s) for outdoor locations.
 - 3. Finish: Manufacturer's standard unless otherwise indicated.
- L. Short Circuit Current Rating:
 - 1. Withstand and Closing Rating: Provide transfer switches, when protected by the supply side overcurrent protective devices to be installed, with listed withstand and closing rating not less than the available fault current at the installed location as indicated on the drawings.
- M. Automatic Transfer Switches:
 - 1. Description: Transfer switches with automatically initiated transfer between sources; electrically operated and mechanically held.
 - 2. Control Functions:
 - a. Automatic mode.
 - b. Test Mode: Simulates failure of primary/normal source.
 - c. Voltage and Frequency Sensing:
 - 1) Undervoltage sensing for each phase of primary/normal source; adjustable dropout/pickup settings.
 - 2) Undervoltage sensing for alternate/emergency source; adjustable dropout/pickup settings.
 - 3) Underfrequency sensing for alternate/emergency source; adjustable dropout/pickup settings.
 - d. Outputs:
 - 1) Contacts for engine start/shutdown (except where direct generator communication interface is provided).
 - 2) Auxiliary contacts; one set(s) for each switch position.
 - 3) Signal before transfer (load disconnect) contacts; for selective load disconnection prior to transfer.
 - e. Adjustable Time Delays:
 - 1) Engine generator start time delay; delays engine start signal to override momentary primary/normal source failures.
 - 2) Transfer to alternate/emergency source time delay.
 - 3) Retransfer to primary/normal source time delay.
 - 4) Signal before transfer (load disconnect) contact time delay.
 - 5) Engine generator cooldown time delay; delays engine shutdown following retransfer to primary/normal source to permit generator to run unloaded for cooldown period.

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- f. In-Phase Monitor (Open Transition Transfer Switches): Monitors phase angle difference between sources for initiating in-phase transfer.
 - g. Engine Exerciser: Provides programmable scheduled exercising of engine generator selectable with or without transfer to load; provides memory retention during power outage.
 - h. Retransfer to Normal Switch: Bypasses time delays for retransfer to primary/normal source.
3. Status Indications:
 - a. Connected to alternate/emergency source.
 - b. Connected to primary/normal source.
 - c. Alternate/emergency source available.
 4. Other Features:
 - a. Communications Capability: Compatible with system indicated. Provide all accessories necessary for proper interface.
 5. Automatic Sequence of Operations:
 - a. Upon failure of primary/normal source for a programmable time period (engine generator start time delay), initiate starting of engine generator where applicable.
 - b. Where applicable, initiate signal before transfer (load disconnect) contacts at programmable time before transfer.
 - c. When alternate/emergency source is available, transfer load to alternate/emergency source after programmable time delay.
 - d. When primary/normal source has been restored, retransfer to primary/normal source after a programmable time delay. Bypass time delay if alternate/emergency source fails and primary/normal source is available.
 - e. Where applicable, initiate shutdown of engine generator after programmable engine cooldown time delay.

2.03 SOURCE QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Perform production tests on transfer switches at factory to verify operation and performance characteristics prior to shipment. Include certified test report with submittals.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that the ratings and configurations of transfer switches are consistent with the indicated requirements.
- C. Verify that rough-ins for field connections are in the proper locations.
- D. Verify that mounting surfaces are ready to receive transfer switches.
- E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship).
- B. Install products in accordance with manufacturer's instructions.
- C. Arrange equipment to provide minimum clearances and required maintenance access.
- D. Provide required support and attachment in accordance with Section 26 0529.
- E. Install transfer switches plumb and level.
- F. Unless otherwise indicated, mount floor-mounted transfer switches on properly sized 3 inch (80 mm) high concrete pad constructed in accordance with Section 03 3000.
- G. Provide grounding and bonding in accordance with Section 26 0526.
- H. Identify transfer switches and associated system wiring in accordance with Section 26 0553.

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3.03 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Prepare and start system in accordance with manufacturer's instructions.
- C. Automatic Transfer Switches:
 - 1. Inspect and test in accordance with NETA ATS, except Section 4.
 - 2. Perform inspections and tests listed in NETA ATS, Section 7.22.3. The insulation-resistance tests listed as optional are not required.
- D. Provide additional inspection and testing as required for completion of associated engine generator testing as specified in Section 26 3213.
- E. Correct defective work, adjust for proper operation, and retest until entire system complies with Contract Documents.
- F. Submit detailed reports indicating inspection and testing results and corrective actions taken.

3.04 CLEANING

- A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

3.05 CLOSEOUT ACTIVITIES

- A. See Section 01 7800 - Closeout Submittals, for closeout submittals.
- B. See Section 01 7900 - Demonstration and Training, for additional requirements.
- C. Demonstration: Demonstrate proper operation of transfer switches to Owner, and correct deficiencies or make adjustments as directed.
- D. Training: Train Owner's personnel on operation, adjustment, and maintenance of transfer switches.
 - 1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
 - 2. Provide minimum of four hours of training.
 - 3. Instructor: Manufacturer's authorized representative.
 - 4. Location: At project site.
- E. Coordinate with related generator demonstration and training as specified in Section 26 3213.

3.06 PROTECTION

- A. Protect installed transfer switches from subsequent construction operations.

3.07 MAINTENANCE

- A. See Section 01 7000 - Execution and Closeout Requirements, for additional requirements relating to maintenance service.
- B. Provide to Owner a proposal as an alternate to the base bid, a separate maintenance contract for the service and maintenance of transfer switches for two years from date of Substantial Completion; Include a complete description of preventive maintenance, systematic examination, adjustment, inspection, and testing, with a detailed schedule.
- C. Provide trouble call-back service upon notification by Owner:
 - 1. Provide on-site response within 4 hours of notification.
 - 2. Include allowance for call-back service during normal working hours at no extra cost to Owner.
 - 3. Owner will pay for call-back service outside of normal working hours on an hourly basis, based on actual time spent at site and not including travel time; include hourly rate and definition of normal working hours in maintenance contract.
- D. Maintain an on-site log listing the date and time of each inspection and call-back visit, the condition of the system, nature of the trouble, correction performed, and parts replaced.

END OF SECTION 26 3600

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**SECTION 26 4300
SURGE PROTECTIVE DEVICES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surge protective devices for service entrance locations.

1.02 RELATED REQUIREMENTS

- A. Section 26 0526 - Grounding and Bonding for Electrical Systems.
- B. Section 26 2416 - Panelboards.
- C. Section 27 1000 - Structured Cabling for Voice and Data: Protectors for communications service entrance.

1.03 ABBREVIATIONS AND ACRONYMS

- A. EMI/RFI: Electromagnetic Interference/Radio Frequency Interference.
- B. SPD: Surge Protective Device.

1.04 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.
- C. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2013.
- D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- E. UL 1283 - Standard for Electromagnetic Interference Filters; Current Edition, Including All Revisions.
- F. UL 1449 - Standard for Surge Protective Devices; Current Edition, Including All Revisions.

1.05 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate size and location of overcurrent device compatible with the actual surge protective device and location to be installed. Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to ordering equipment.

1.06 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Include detailed component information, voltage, surge current ratings, repetitive surge current capacity, voltage protection rating (VPR) for all protection modes, maximum continuous operating voltage (MCOV), nominal discharge current (I-n), short circuit current rating (SCCR), connection means including any required external overcurrent protection, enclosure ratings, outline and support point dimensions, weight, service condition requirements, and installed features.
 - 1. SPDs with EMI/RFI filter: Include noise attenuation performance.
- C. Shop Drawings: Include wiring diagrams showing all factory and field connections with wire and circuit breaker/fuse sizes.
- D. Certificates: Manufacturer's documentation of listing for compliance with the following standards:
 - 1. UL 1449.
- E. Manufacturer's Installation Instructions: Include application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- F. Operation and Maintenance Data: Include information on status indicators and recommended maintenance procedures and intervals.

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- G. Warranty: Submit sample of manufacturer's warranty and documentation of final executed warranty completed in Owner's name and registered with manufacturer.
- H. Project Record Documents: Record actual connections and locations of surge protective devices.

1.07 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.08 DELIVERY, STORAGE, AND PROTECTION

- A. Store in a clean, dry space in accordance with manufacturer's written instructions.

1.09 FIELD CONDITIONS

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

1.10 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Manufacturer's Warranty: Provide minimum five year warranty covering repair or replacement of surge protective devices showing evidence of failure due to defective materials or workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Field-installed, Externally Mounted Surge Protective Devices:
 - 1. ABB/GE: www.geindustrial.com/#sle.
 - 2. Advanced Protection Technologies, Inc (APT): www.aptsurge.com/#sle.
 - 3. Current Technology; a brand of Thomas & Betts Power Solutions: www.tnbpowersolutions.com/#sle.
 - 4. Schneider Electric; Square D Brand Surgelogic Products: www.surgelogic.com/#sle.
 - 5. Surge Suppression, LLC (SSI): www.surgesuppression.com/#sle.
- B. Factory-installed, Internally Mounted Surge Protective Devices:
 - 1. Same as manufacturer of equipment containing surge protective device, to provide a complete listed assembly including SPD.
- C. Substitutions: See Section 01 6000 - Product Requirements.
- D. Source Limitations: Furnish surge protective devices produced by a single manufacturer and obtained from a single supplier.

2.02 SURGE PROTECTIVE DEVICES - GENERAL REQUIREMENTS

- A. Description: Factory-assembled surge protective devices (SPDs) for 60 Hz service; listed, classified, and labeled as suitable for the purpose intended; system voltage as indicated on the drawings.
- B. Unless otherwise indicated, provide field-installed, externally-mounted or factory-installed, internally-mounted SPDs.
- C. List and label as complying with UL 1449, Type 1 when connected on line side of service disconnect overcurrent device and Type 1 or 2 when connected on load side of service disconnect overcurrent device.

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- D. Protected Modes:
 1. Wye Systems: L-N, L-G, N-G, L-L.
 2. Delta Systems: L-G, L-L.
 3. Single Split Phase Systems: L-N, L-G, N-G, L-L.
- E. UL 1449 Voltage Protection Ratings (VPRs):
 1. 240/120V System Voltage: Not more than 1,000 V for L-N, L-G, and N-G modes and 1,200 V for L-L mode. Service Equipment
 2. 480Y/277V System Voltage: Not more than 1,500 V for L-N, L-G, and N-G modes and 2,000 V for L-L mode.
- F. UL 1449 Maximum Continuous Operating Voltage (MCOV): Not less than 115% of nominal system voltage.
- G. Enclosure Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
 1. Indoor clean, dry locations: Type 1.
 2. Outdoor locations: Type 3R.
- H. Mounting for Field-installed, Externally Mounted SPDs: Unless otherwise indicated, as specified for the following locations:
 1. Provide surface-mounted SPD where mounted in non-public areas or adjacent to surface-mounted equipment.
- I. Equipment Containing Factory-installed, Internally Mounted SPDs: Listed and labeled as a complete assembly including SPD.
 1. Panelboards: See Section 26 2416.

2.03 SURGE PROTECTIVE DEVICES FOR SERVICE ENTRANCE LOCATIONS

- A. Surge Protective Device:
 1. Protection Circuits: Field-replaceable modular or non-modular.
 2. Surge Current Rating: Not less than 120 kA per mode/240 kA per phase.
 3. UL 1449 Nominal Discharge Current (I-n): 20 kA.
 4. UL 1449 Short Circuit Current Rating (SCCR): Not less than the available fault current at the installed location as indicated on the drawings.
 5. EMI/RFI Filtering: Provide EMI/RFI filter to attenuate electrical noise; listed as complying with UL 1283 for Type 2 SPDs (UL 1283 listing not available for Type 1 SPDs).
 6. Diagnostics:
 - a. Protection Status Monitoring: Provide indicator lights to report the protection for each phase.
 - b. Alarm Notification: Provide indicator light and audible alarm to report alarm condition. Provide button to manually silence audible alarm.
 - c. Remote Status Monitoring: Provide Form C dry type contacts (normally open and normally closed) for remote annunciation of status.
 - d. Surge Counter: Provide surge event counter with manual reset button, surge count retention upon power loss, and six digit LCD display that indicates quantity of surge events.
 7. Provide surge rated integral disconnect switch for SPDs not connected to a dedicated circuit breaker or fused switch or not direct bus connected.

2.04 SURGE PROTECTIVE DEVICES FOR DISTRIBUTION LOCATIONS

- A. Surge Protective Device:
 1. Protection Circuits: Field-replaceable modular or non-modular.
 2. Surge Current Rating: Not less than 80 kA per mode/160 kA per phase.
 3. UL 1449 Nominal Discharge Current (I-n): 20 kA.
 4. UL 1449 Short Circuit Current Rating (SCCR): Not less than the available fault current at the installed location as indicated on the drawings.
 5. Diagnostics:

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- a. Protection Status Monitoring: Provide indicator lights to report the protection status for each phase.
 - b. Alarm Notification: Provide indicator light and audible alarm to report alarm condition. Provide button to manually silence audible alarm.
 - c. Remote Status Monitoring: Provide Form C dry type contacts (normally open and normally closed) for remote annunciation of status.
 - d. Surge Counter: Provide surge event counter with manual reset button, surge count retention upon power loss, and six digit LCD display that indicates quantity of surge events.
6. Provide surge rated integral disconnect switch for SPDs not connected to a dedicated circuit breaker or fused switch or not direct bus connected.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that the service voltage and configuration marked on the SPD are consistent with the service voltage and configuration at the location to be installed.
- C. Verify system grounding and bonding is in accordance with Section 26 0526, including bonding of neutral and ground for service entrance and separately derived systems where applicable. Do not energize SPD until deficiencies have been corrected.
- D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship).
- B. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- C. Unless indicated otherwise, connect service entrance surge protective device on load side of service disconnect main overcurrent device.
- D. Provide conductors with minimum ampacity as required by NFPA 70, as required by NFPA 70, and as required by NFPA 70.
- E. Install conductors between SPD and equipment terminations as short and straight as possible, not exceeding manufacturer's recommended maximum conductor length. Breaker locations may be reasonably rearranged in order to provide leads as short and straight as possible. Twist conductors together to reduce inductance.
- F. Do not energize SPD until bonding of neutral and ground for service entrance and separately derived systems is complete in accordance with Section 26 0526 where applicable. Replace SPDs damaged by improper or missing neutral-ground bond.
- G. Disconnect SPD prior to performing any high potential testing. Replace SPDs damaged by performing high potential testing with SPD connected.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Perform inspections and tests listed in NETA ATS Section 7.19.1.
- D. Procure services of a qualified manufacturer's representative to observe installation and assist in inspection, testing, and adjusting. Include manufacturer's reports with field quality control submittals.

3.04 CLEANING

- A. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION 26 4300

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**SECTION 26 5100
INTERIOR LIGHTING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Interior luminaires.
- B. Emergency lighting units.
- C. Exit signs.
- D. Drivers.
- E. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 26 0529 - Hangers and Supports for Electrical Systems.
- B. Section 26 0533.16 - Boxes for Electrical Systems.
- C. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- D. Section 26 0923 - Lighting Control Devices: Automatic controls for lighting including occupancy sensors, outdoor motion sensors, time switches, outdoor photo controls, and daylighting controls.
- E. Section 26 2726 - Wiring Devices: Manual wall switches and wall dimmers.

1.03 REFERENCE STANDARDS

- A. 47 CFR 15 - Radio Frequency Devices; current edition.
- B. ANSI C82.4 - American National Standard for Ballasts for High-Intensity-Discharge and Low-Pressure Sodium Lamps (Multiple-Supply Type); 2002.
- C. ANSI C82.11 - American National Standard for Lamp Ballasts - High Frequency Fluorescent Lamp Ballasts - Supplements; 2011.
- D. IEC 60529 - Degrees of Protection Provided by Enclosures (IP Code); 2013-08, with 2015 Corrigendum.
- E. IEEE C62.41.2 - Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and less) AC Power Circuits; 2002 (Cor 1, 2012).
- F. IES LM-79 - Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products; 2008.
- G. IES LM-80 - Approved Method: Measuring Luminous Flux and Color Maintenance of LED Packages, Arrays, and Modules; 2015.
- H. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- I. NECA/IESNA 500 - Standard for Installing Indoor Commercial Lighting Systems; 2006.
- J. NECA/IESNA 502 - Standard for Installing Industrial Lighting Systems; 2006.
- K. NEMA 410 - Performance Testing for Lighting Controls and Switching Devices with Electronic Drivers and Discharge Ballasts; 2015.
- L. NEMA LE 4 - Recessed Luminaires, Ceiling Compatibility; 2012.
- M. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- N. NFPA 101 - Life Safety Code; 2015.
- O. UL 844 - Luminaires for Use in Hazardous (Classified) Locations; Current Edition, Including All Revisions.
- P. UL 924 - Emergency Lighting and Power Equipment; Current Edition, Including All Revisions.
- Q. UL 935 - Fluorescent-Lamp Ballasts; Current Edition, Including All Revisions.

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- R. UL 1029 - High-Intensity-Discharge Lamp Ballasts; Current Edition, Including All Revisions.
- S. UL 1598 - Luminaires; Current Edition, Including All Revisions.
- T. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the installation of luminaires with mounting surfaces installed under other sections or by others. Coordinate the work with placement of supports, anchors, etc. required for mounting. Coordinate compatibility of luminaires and associated trims with mounting surfaces at installed locations.
 - 2. Coordinate the placement of luminaires with structural members, ductwork, piping, equipment, diffusers, fire suppression system components, and other potential conflicts installed under other sections or by others.
 - 3. Coordinate the placement of exit signs with furniture, equipment, signage or other potential obstructions to visibility installed under other sections or by others.
 - 4. Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings:
 - 1. Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.
 - 2. Provide photometric calculations where luminaires are proposed for substitution substitutes will not be accepted unless photometric calculations are provided and approved.
- C. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, installed accessories, and ceiling compatibility; include model number nomenclature clearly marked with all proposed features.
 - 1. LED Luminaires:
 - a. Include estimated useful life, calculated based on IES LM-80 test data.
 - b. Include IES LM-79 test report for all substitutions.
 - 2. Provide electronic files of photometric data certified by a National Voluntary Laboratory Accreditation Program (NVLAP) lab or independent testing agency; certified by an independent testing agency in IESNA LM-63 standard format.
 - 3. Lamps: Include rated life, color temperature, color rendering index (CRI), and initial and mean lumen output.
- D. Sustainable Design Documentation: Submit manufacturer's product data on lamp mercury content and rated lamp life, showing compliance with specified requirements.
- E. Samples:
 - 1. Provide one sample(s) of each specified luminaire where indicated.
- F. Certificates for Dimming Ballasts: Manufacturer's documentation of compatibility with dimming controls to be installed.
- G. Field quality control reports.
- H. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- I. Operation and Maintenance Data: Instructions for each product including information on replacement parts.

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- J. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 1. See Section 01 6000 - Product Requirements, for additional provisions.
 2. Extra Lenses and Louvers: Two percent of total quantity installed for each type, but not less than one of each type.
- K. Project Record Documents: Record actual connections and locations of luminaires and any associated remote components.

1.06 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years experience.
- D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND PROTECTION

- A. Receive, handle, and store products according to NECA/IESNA 500 (commercial lighting), NECA/IESNA 502 (industrial lighting), and manufacturer's written instructions.
- B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.

1.08 FIELD CONDITIONS

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

1.09 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Provide five year manufacturer warranty for all LED luminaires, including drivers.

PART 2 PRODUCTS

2.01 LUMINAIRE TYPES

- A. Furnish products as indicated in luminaire schedule included on the drawings.
- B. Substitutions: See Section 01 6000 - Product Requirements except where individual luminaire types are designated with substitutions not permitted.

2.02 LUMINAIRES

- A. Manufacturers:
 1. Acuity Brands, Inc: www.acuitybrands.com/#sle.
 2. Philips Lighting North America Corporation; www.lightingproducts.philips.com/#sle.
 3. Alloy LED; www.alloyled.com/#sle.
 4. Cooper Lighting, a division of Cooper Industries: www.cooperindustries.com/#sle.
 5. Electro-Matic Visual, Inc; www.empvisual.com.
 6. Hubbell Lighting, Inc: www.hubbellighting.com/#sle.
 7. Lutron Electronics Company, Inc; www.lutron.com/#sle.
 8. Substitutions: See Section 01 6000 - Product Requirements.
- B. Provide products that comply with requirements of NFPA 70.
- C. Provide products that are listed and labeled as complying with UL 1598, where applicable.
- D. Provide products listed, classified, and labeled as suitable for the purpose intended.
- E. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.

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- F. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, supports, trims, accessories, etc. as necessary for a complete operating system.
- G. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.
- H. Recessed Luminaires:
 - 1. Ceiling Compatibility: Comply with NEMA LE 4.
 - 2. Luminaires Recessed in Insulated Ceilings: Listed and labeled as IC-rated, suitable for direct contact with insulation and combustible materials.
 - 3. Luminaires Recessed in Sloped Ceilings: Provide suitable sloped ceiling adapters.
 - 4. Air-Handling Recessed Fluorescent Luminaires: Suitable for air supply/return, heat removal, or combination as indicated.
- I. Hazardous (Classified) Location Luminaires: Listed and labeled as complying with UL 844 for the classification of the installed location.
- J. LED Luminaires:
 - 1. Components: UL 8750 recognized or listed as applicable.
 - 2. Tested in accordance with IES LM-79 and IES LM-80.
 - 3. LED Estimated Useful Life: Minimum of 50,000 hours at _____ lumen maintenance, calculated based on IES LM-80 test data.
- K. LED Tape Lighting Systems: Provide all power supplies, drivers, cables, connectors, channels, covers, mounting accessories, and interfaces as necessary to complete installation.
 - 1. LED Tape - General Requirements:
 - a. Listed.
 - b. Designed for field cutting in accordance with listing.
 - 2. White LED Tape:
 - a. Correlated Color Temperature (CCT): 3000 K unless otherwise indicated.
 - b. Color Rendering Index (CRI): Not less than 90.
- L. LED Luminaire Components: UL 8750 recognized or listed as applicable.
- M. Track Lighting Systems: Provide track compatible with specified track heads, with all connectors, power feed fittings, dead ends, hangers and canopies as necessary to complete installation.
- N. Luminaires Mounted in Continuous Rows: Provide quantity of units required for length indicated, with all accessories required for joining and aligning.

2.03 EMERGENCY LIGHTING UNITS

- A. Manufacturers:
 - 1. Acuity Brands, Inc: www.acuitybrands.com/#sle.
 - 2. Cooper Lighting, a division of Cooper Industries: www.cooperindustries.com/#sle.
 - 3. Hubbell Lighting, Inc: www.hubbellighting.com/#sle.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Description: Emergency lighting units complying with NFPA 101 and all applicable state and local codes, and listed and labeled as complying with UL 924.
- C. Operation: Upon interruption of normal power source or brownout condition exceeding 20 percent voltage drop from nominal, solid-state control automatically switches connected lamps to integral battery power for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.
- D. Battery:
 - 1. Size battery to supply all connected lamps, including emergency remote heads where indicated.
- E. Diagnostics: Provide power status indicator light and accessible integral test switch to manually activate emergency operation.

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- F. Provide low-voltage disconnect to prevent battery damage from deep discharge.
- G. Self-Diagnostics: Provide units that self-monitor functionality and automatically perform testing required by NFPA 101 where indicated; provide indicator light(s) to report test and diagnostic status.
- H. Accessories:
 1. Provide compatible accessory mounting brackets where indicated or required to complete installation.
 2. Provide compatible accessory high impact polycarbonate vandal shields where indicated.
 3. Provide compatible accessory wire guards where indicated.
 4. Where indicated, provide emergency remote heads that are compatible with the emergency lighting unit they are connected to and suitable for the installed location.

2.04 EXIT SIGNS

- A. Manufacturers - Powered and Self-Luminous Signs:
 1. Acuity Brands, Inc: www.acuitybrands.com/#sle.
 2. Cooper Lighting, a division of Cooper Industries: www.cooperindustries.com/#sle.
 3. Hubbell Lighting, Inc: www.hubbellighting.com/#sle.
 4. Philips Lighting North America Corporation; www.lightingproducts.philips.com/#sle.
 5. Substitutions: See Section 01 6000 - Product Requirements.
- B. Description: Internally illuminated exit signs with LEDs unless otherwise indicated; complying with NFPA 101 and all applicable state and local codes, and listed and labeled as complying with UL 924.
 1. Number of Faces: Single or double as indicated or as required for the installed location.
 2. Directional Arrows: As indicated or as required for the installed location.
- C. Self-Powered Exit Signs:
 1. Operation: Upon interruption of normal power source or brownout condition exceeding 20 percent voltage drop from nominal, solid-state control automatically switches connected lamps to integral battery power for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.
 2. Battery: Sealed maintenance-free nickel cadmium unless otherwise indicated.
 3. Diagnostics: Provide power status indicator light and accessible integral test switch to manually activate emergency operation.
 4. Self-Diagnostics: Provide units that self-monitor functionality and automatically perform testing required by NFPA 101 where indicated; provide indicator light(s) to report test and diagnostic status.
- D. Self-Luminous Exit Signs: Internally illuminated by tritium gas sealed inside phosphor lined gas tubes, requiring no electrical power to operate, with a service life of 20 years unless otherwise indicated.
- E. Accessories:
 1. Provide compatible accessory high impact polycarbonate vandal shields where indicated.
 2. Provide compatible accessory wire guards where indicated.

2.05 DRIVERS

- A. Manufacturers:
 1. Alloy LED; www.alloyled.com/#sle.
 2. General Electric Company/GE Lighting: www.gelighting.com.
 3. Lutron Electronics Company, Inc; www.lutron.com/#sle.
 4. Osram Sylvania: www.sylvania.com.
 5. Philips Lighting North America Corporation; www.usa.lighting.philips.com/#lse.
 6. Substitutions: See Section 01 6000 - Product Requirements.
 7. Manufacturer Limitations: Where possible, for each type of luminaire provide ballasts produced by a single manufacturer.
- B. Drivers - General Requirements:

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1. Provide ballasts containing no polychlorinated biphenyls (PCBs).
 2. Minimum Efficiency/Efficacy: Provide ballasts complying with all current applicable federal and state efficiency/efficacy standards.
- C. Dimmable LED Drivers:
1. Dimming Range: Continuous dimming from 100 percent to five percent relative light output unless dimming capability to lower level is indicated, without flicker.
 2. Control Compatibility: Fully compatible with the dimming controls to be installed.

2.06 ACCESSORIES

- A. Stems for Suspended Luminaires: Steel tubing, minimum 1/2" size, factory finished to match luminaire or field-painted as directed.
- B. Threaded Rods for Suspended Luminaires: Zinc-plated steel, minimum 1/4" size, field-painted as directed.
- C. Provide accessory plaster frames for luminaires recessed in plaster ceilings.
- D. Fire-Rated Luminaire Enclosures:
 1. Manufacturers:
 - a. Fire Rated Product Specialties Corp: www.frpsonline.com/#sle.
 - b. Substitutions: See Section 01 6000 - Product Requirements.
 2. Provide as required to preserve fire resistance rating of building elements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.
- C. Verify that suitable support frames are installed where required.
- D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.
- E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

- A. Coordinate locations of outlet boxes provided under Section 26 0533.16 as required for installation of luminaires provided under this section.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Install products in accordance with manufacturer's instructions.
- D. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 500 (commercial lighting).
- E. Provide required support and attachment in accordance with Section 26 0529.
- F. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
- G. Suspended Ceiling Mounted Luminaires:
 1. Do not use ceiling tiles to bear weight of luminaires.
 2. Do not use ceiling support system to bear weight of luminaires unless ceiling support system is certified as suitable to do so.
 3. Secure surface-mounted and recessed luminaires to ceiling support channels or framing members or to building structure as per manufacturer's installation instructions.

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4. Secure surface-mounted, recessed, and pendant-mounted luminaires to building structure.
 5. Secure lay-in luminaires to ceiling support channels using listed safety clips at two corners.
 6. In addition to ceiling support wires, provide two galvanized steel safety wire(s), minimum 12 gage, connected from opposing corners of each recessed luminaire to building structure.
- H. Recessed Luminaires:
1. Install trims tight to mounting surface with no visible light leakage.
 2. Non-IC Rated Luminaires: Maintain required separation from insulation and combustible materials according to listing.
 3. Luminaires Recessed in Fire-Rated Ceilings: Install using accessories and firestopping materials to meet regulatory requirements for fire rating.
- I. Suspended Luminaires:
1. Unless otherwise indicated, specified mounting heights are to bottom of luminaire.
 2. Install using the suspension method indicated, with support lengths and accessories as required for specified mounting height.
 3. Provide minimum of two supports for each luminaire equal to or exceeding 4 feet nominal length, with no more than 4 feet (1.2 m) between supports.
 4. Install canopies tight to mounting surface.
 5. Unless otherwise indicated, support pendants from swivel hangers.
- J. Wall-Mounted Luminaires: Unless otherwise indicated, specified mounting heights are to center of luminaire.
- K. Install accessories furnished with each luminaire.
- L. Bond products and metal accessories to branch circuit equipment grounding conductor.
- M. Emergency Lighting Units:
1. Unless otherwise indicated, connect unit to unswitched power from same circuit feeding normal lighting in same room or area. Bypass local switches, contactors, or other lighting controls.
 2. Install lock-on device on branch circuit breaker serving units.
- N. Exit Signs:
1. Unless otherwise indicated, connect unit to unswitched power from same circuit feeding normal lighting in same room or area. Bypass local switches, contactors, or other lighting controls.
 2. Install lock-on device on branch circuit breaker serving units.
- O. Install lamps in each luminaire.
- P. Lamp Burn-In: Operate lamps at full output for prescribed period per manufacturer's recommendations prior to use with any dimming controls. Replace lamps that fail prematurely due to improper lamp burn-in.

3.04 FIELD QUALITY CONTROL

- A. Inspect each product for damage and defects.
- B. Operate each luminaire after installation and connection to verify proper operation.
- C. Test _____ to verify proper operation upon loss of normal power supply.
- D. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Engineer.

3.05 ADJUSTING

- A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Architect. Secure locking fittings in place.
- B. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Engineer. Secure locking fittings in place.

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- C. Aim and position adjustable emergency lighting unit lamps to achieve optimum illumination of egress path as required or as directed by Architect or authority having jurisdiction.
- D. Aim and position adjustable emergency lighting unit lamps to achieve optimum illumination of egress path as required or as directed by Engineer or authority having jurisdiction.
- E. Exit Signs with Field-Selectable Directional Arrows: Set as indicated or as required to properly designate egress path as directed by Architect or authority having jurisdiction.

3.06 CLEANING

- A. Clean surfaces according to NECA 500 (commercial lighting) and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

3.07 CLOSEOUT ACTIVITIES

- A. See Section 01 7900 - Demonstration and Training, for additional requirements.
- B. Demonstration: Demonstrate proper operation of luminaires to Architect, and correct deficiencies or make adjustments as directed.

3.08 PROTECTION

- A. Protect installed luminaires from subsequent construction operations.

3.09 ATTACHMENTS

- A. Luminaire schedule.
- B. Luminaire cut sheets.

END OF SECTION 26 5100

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SECTION 31 2230
CLEARING AND GRUBBING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Clearing and protection of vegetation.
- B. Temporary removal and replacement of walkways, structures, fences, walls or other site structures that interfere with project installation.

1.02 RELATED REQUIREMENTS

- A. Section 01 1000 - Summary: Limitations on Contractor's use of site and premises.
- B. Section 01 5000 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.
- C. Section 01 7000 - Execution Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products.
- D. Section 31 2270 - Erosion Control
- E. Section 31 2315 - Excavation
- F. Section 31 2316 - Fill and Backfill: Fill material for filling holes, pits, and excavations generated as a result of removal operations.
- G. Section 31 2317 - Trenching for Site Utilities
- H. Section 31 2318 - Rock Removal
- I. Section 32 2901 - Restoration of Surfaces
- J. It is the intent of this Section to limit the area of clearing and grubbing to the minimum area possible to allow for the proper installation of the Work and to preserve all plantings, trees, shrubs, grass and natural vegetation to the maximum possible extent.

1.03 SUBMITTALS

- A. Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Contractor's schedule indicating dates upon which Contractor and Engineer will traverse the site to allow Contractor to indicate the trees and plantings which he has determined to be necessary to remove and to obtain Engineer's approval.

1.04 QUALITY ASSURANCE

- A. Confine clearing and grubbing operations to within the following limits:
 - 1. All areas where work is required to be done, but, to the minimum extent possible to properly install the work.
 - 2. Within the Grading Limits when shown on the Drawings.

3. Within the easements provided by Owner.
 4. Within the property lines of lands owned by Owner.
- B. No trees, plants, shrubs, flowers or vegetables shall be removed or trimmed without the prior permission of the Engineer, except where otherwise specified.
 - C. Provide at least one person who shall be present at all times during clearing and grubbing operations who shall be thoroughly familiar with the following:
 1. The types of trees and plantings encountered.
 2. The proper procedures and methods for taking-up and preserving trees and plantings.
 3. The proper procedures and methods for felling, trimming, pruning and caring for trees and plants and their roots.
 - D. Clearing Firm: Company specializing in the type of work required.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Store trees, plants and shrubs in protected areas and give ample water to keep them in a thriving condition for subsequent replanting.
- B. Store slate and flagstone sidewalk sections, granite and stone curbs, fences, signs, guide rails and other items at approved locations for subsequent reinstallation.
- C. Obstruction of roads, driveways, sidewalks, gutters and drainage ditches, swales and channels with stored materials is not permitted.

1.06 PROJECT CONDITIONS

- A. Burning of materials at the site is not permitted without the proper authorization of the appropriate local and state agencies.
- B. Materials not specified to be stored or reused shall be promptly removed and disposed of off-site.
- C. The locations of trees, plantings, vegetation, sidewalks, curbs and other living and nonliving items, as shown on the Drawings, have been determined by actual surveys at the time surveys were made. Since that time, additional items may have been built, some items may have been removed, and the condition of things may have changed. Carefully examine the site prior to bidding and become fully acquainted with the existing conditions as the Contract Price includes the cost for removing and replacing all obstacles and obstructions, as required, whether shown on the Drawings or not.
- D. Use all means necessary to protect existing objects designated to remain and, in the event of damage, immediately make all necessary repairs and replacements.
- E. Minimize production of dust due to clearing operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.
- F. Comply with other requirements specified in Section 01 7000.

1.07 SCHEDULING

- A. Avoid interference with the use of, and passage to and from, adjacent buildings, facilities, driveways, walks, drainage systems and road.
- B. Pavements which are required to be removed, including highways, driveways and walks, may be saw cut in advance, but do not remove until the work is ready to be installed.
- C. Do not remove highway signs, guide rails and all other control, safety and warning devices until just prior to the installation of the work.
- D. Do not remove fences until the property owners affected are notified at least four days in advance of such removal. Unless written permission from a fence owner is received, do not remove a fence more than 48 hours in advance of the installation of the work affecting the fence.
- E. It is the intent of this Section that all items affecting traffic, safety, lives and the containment of humans and animals and all items essential to the protection of property or the operation of a business be left in place as long as possible and replaced as soon as possible when such items must be removed.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Pruning Paint - Asphalt base paint specially formulated for horticultural application to cut or damaged plant tissue.
- B. Explosives - Explosives are not permitted for clearing and grubbing operations.
- C. Other Materials - All other materials, not specifically described but required for proper completion of the work of this Section, shall be as selected by Contractor subject to the approval of Engineer.

PART 3 EXECUTION

3.01 SITE CLEARING

- A. Comply with other requirements specified in Section 01 7000.
- B. Minimize production of dust due to clearing operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.

3.02 EXAMINATION

- A. Verify that all limiting boundaries such as permanent and temporary easements, property lines, rights-of-way and grading limits have been accurately located and clearly marked.
- B. Verify that pipeline routings and other items of work have been accurately located and clearly marked.

3.03 PREPARATION

- A. Mark all trees, plantings and other objects which are deemed necessary to be removed, trimmed, cut or taken-up and preserved.
- B. Notify and accompany Engineer through the site to inspect the items marked under Paragraph A, above. Describe which are to be trimmed, removed, and replanted and secure Engineer's approval.

3.04 CLEARING AND GRUBBING

- A. Clearing consists of cutting and disposing of all trees, down timber, stubs, brush, bushes, snags, rubbish, debris, and other objectionable matter and materials and the removal and storage of fences, signs, walks, guide rails, curbs and other items to be restored.
- B. Grubbing consists of the removal and disposal of all stumps, roots, duff, foundations and other objectionable matter and materials.
- C. All operations shall be done in a manner so that present growth will blend with the limits of construction and a natural appearance will be attained.
- D. Employ whatever measures are necessary to avoid erosion.

3.05 VEGETATION

- A. In grassed, planted and open areas, do not remove or trim trees or plantings without the prior permission of Engineer. Take-up and preserve small trees, plantings, flowers and similar vegetation for reuse.
- B. In wooded areas, trees may be removed and/or trimmed, as required, for the proper installation of the work. Gross and unnecessary removal of trees is not permitted.
- C. If it is impractical to fall trees as a whole, remove them in sections according to standard practices of professional tree removal. Fall trees to the center of the area being cleared to minimize damage to trees that are to be left standing.
- D. Immediately after falling a tree, remove branches, cut trunk and limbs and remove all materials from the site.
- E. All trees to remain shall not come in contact with any machine or appliance that will in any manner injure, sear or kill them.
- F. Property owners shall have the right to cut and remove any wood in advance of the Contractor's operations. All other timber and wood which is removed shall become the property of the Contractor.
- G. All trees left standing which have been trimmed or become scarred by Contractor's operations shall be promptly repaired by properly cutting, smoothing and painting.
- H. Trees to be trimmed shall be evenly cut to achieve neat severance with the least possible damage to the tree.
- I. Where roots are cut or damaged, apply wet burlap to prevent drying out.

3.06 DISPOSAL

- A. Burning at the site is not permitted without the proper authorization of the appropriate

local and state agencies.

- B. Burial of materials at the site is not permitted.
- C. All materials shall be promptly removed and disposed of away from the site.
- D. Methods of disposal shall conform to the requirements of all Federal, State and Local Laws and Ordinances.
- E. Leave Site in a neat and orderly condition.

3.07 PAVEMENTS, WALKS, CURBS AND RAILS

- A. Remove existing pavements, walks and curbs to the limits shown on the Drawings, or if not shown, to the minimum extent possible.
- B. Saw cut asphalt and concrete paved surfaces before removal. Use a saw that will cut a neat, straight joint line.
- C. Carefully remove slate and flag stone walks, granite and stone curbs and guide rails to the minimum extent possible. Terminate removals at a joint or post. Store and protect for reuse.

3.08 WALLS, FENCES, STRUCTURES AND OTHER CONSTRUCTIONS

- A. All walls, fences, signs, sheds and other obstructions encountered shall be carefully taken up and stored for subsequent replacement.
- B. Do not disturb property markers unless absolutely necessary. If it becomes necessary to disturb or remove a property marker, have a qualified surveyor provide four ties to the marker. The qualified surveyor shall replace the marker as soon as possible.
- C. Remove and dispose of all other obstructions which will affect the work or which are specifically designated to be removed.

3.09 PROTECTION

- A. Carefully protect and guard all trees, shrubs and vegetation and take every precaution to avoid damage to utilities, buildings and other property.
- B. Injured or damaged trees shall be repaired in accordance with EXTERIOIR PLANTS.
- C. All trees, shrubs or plantings which are taken up for subsequent reuse, and die, shall be replaced with first class balled and burlap.

3.10 REPLANTING AND RESTORATION OF SURFACES

- A. The requirements for replanting and restoration of surfaces are contained in specification section 32 2901 RESTORATION OF SURFACES.

END OF SECTION

SECTION 31 2250

SOIL COMPACTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Requirements for soil compaction.

1.02 RELATED SECTIONS

- A. Division 31 - Earth Work

1.03 SUBMITTALS

- A. Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. List and description of proposed compaction equipment.
- C. Copies of the results of the laboratory sieve analyses and moisture density tests, certified by the Testing Laboratory.

1.04 QUALITY ASSURANCE

- A. The taking of samples and the performing of field compaction density tests shall be done by an independent testing laboratory.
- B. Provide at least one person who shall be present at all times during the soil compaction operations and who shall be thoroughly familiar with the various types of compaction equipment, proper compacting techniques and method, and soils behavior, and who shall direct the compaction operations.

1.05 PROJECT CONDITIONS

- A. Compaction shall not take place in freezing weather or when materials to be compacted are frozen, too wet or moist, or too dry.
- B. Schedule the Work to allow ample time for laboratory tests and to permit the collecting of samples and the performing of field density tests during the backfilling and compaction operations.
- C. Protect pipes, structures and all other subsurface work from displacement or injury during compaction operations.

PART 2 PRODUCTS

2.01 COMPACTION

- A. Utilize the proper compaction methods and equipment to suit the soils and conditions encountered.

2.02 LABORATORY TEST REPORTS

- A. As a minimum, the laboratory moisture-density testing reports shall contain the following:
1. Name.
 2. Date, time and specified location from which sample was taken and name of person who collected the sample.
 3. Moisture - Density Curve plotted on graph paper to as larger as scale as practical with all points used to derive the curve being clearly visible.
 4. Designation of the test method used.
 5. The optimum density and moisture content.
 6. A description of the sample.
 7. The date the test was performed and the person who performed the test.
 8. The Project name, identification and Contractor's name.
 9. The signature of a responsible officer of the Testing Laboratory certifying to the information contained in the report.
- B. As a minimum, the field compaction density testing reports shall contain the following:
1. Name.
 2. Date, time, depth and specified location from which sample was taken and name of person who collected the sample.
 3. Designation of the test method used.
 4. Designation of the material being tested.
 5. Test number.
 6. In place dry density and moisture content.
 7. Optimum density and moisture content.
 8. Percentage of optimum density achieved.
 9. The Project name, identification and Contractor's name.
 10. The signature of a responsible officer of the Testing Laboratory certifying to the information contained in the report.

2.03 OTHER MATERIALS

- A. All other materials which are required to achieve adequate compaction shall be as selected by Contractor subject to approval of Engineer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that layers of material are no thicker than the maximum thickness specified in other Sections.
- B. Verify that moisture content is nearly optimum.
- C. Do not begin compaction operations until conditions are satisfactory.

3.02 PERFORMANCE

- A. Compaction densities shown are percentage of the maximum density obtainable at optimum moisture content as determined by ASTM D1557, Method C (Modified Proctor).
- B. Moisten or dry each layer of material to achieve optimum moisture content. Unless otherwise specified or directed by Engineer, compact each layer of material to the following required densities:

<u>Location</u>	<u>Density</u>
Under concrete slabs, foundations and footings	95%
Backfill around Structures	90%
Embankments	90%
Paved Areas	95%
All Other Areas	
Select Fill*	95%
Remainder of Trench	90%**

* Bedding, around pipes, over pipes and over sand encasements.

** Or density consistent with existing conditions.

3.03 FIELD QUALITY CONTROL

- A. Perform a laboratory moisture density test for each type of soil proposed for use or encountered in the Work. Determine optimum moisture content in accordance with ASTM D1557, Method C.
- B. Engineer will designate the time, date and exact location of all field compaction density tests. Field density test may be ordered by Engineer in accordance with the following average frequencies:
 - 1. Under Structures - One test for every 400 square foot area of each layer of compacted granular fill.

2. Outside of Structures - One test for each foot of backfill at intervals of approximately 50 feet around the structure.
 3. Trenches - One test for each foot of backfill at intervals of approximately 200 feet along the trench.
 4. Embankment - Six tests for each foot of compacted fill.
 5. Roads - One test for each layer of compacted fill and base material at intervals of approximately 200 feet along the roadway.
 6. Parking Areas and Sidewalks - One test for every 750 square foot area at parking areas and one test at intervals of 100 feet along sidewalks.
- C. Testing frequency indicated in Paragraph 3.03.B is at the discretion of the Engineer, and may be decreased as the Project progresses.
- D. Field density and moisture testing shall conform to the requirements of ASTM D1556 or D2922 and ASTM D3017. Soils shall be described in accordance with ASTM D2488, Visual-Manual Procedure.

3.04 COORDINATION

- A. Provide all assistance and cooperation during testing and coordination operations to allow ample time for the required sampling and testing.
- B. Perform field inspection and testing in accordance with Section 01400 - Quality Requirements.

3.05 ADJUST AND CLEAN

- A. Replace or repair any pipe, structure or other Work which has been displaced, damaged, or injured.
- B. Compacted soils not meeting compaction densities shall be re-excavated, re-compacted and retested at the Contractor's expense until all requirements are met.

END OF SECTION

SECTION 31 2270

EROSION CONTROL

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Prevention of erosion, siltation and sedimentation due to construction activities.
- B. Prevention of sedimentation of waterways, open drainage ways, and storm and sanitary sewers due to construction activities.
- C. Restoration of areas eroded due to insufficient preventive measures.
- D. Compensation of Owner for fines levied by authorities having jurisdiction due to non-compliance by Contractor.

1.02 RELATED SECTIONS

- A. Section 31 2230 - Clearing and Grubbing: Limits of clearing; disposition of vegetative clearing debris.
- B. Section 31 2310 - Site Grading: Temporary and permanent grade changes for erosion control.
- C. Section 31 2373 - Riprap and Stone Protection: Temporary and permanent stabilization using riprap and stone.
- D. Section 32 2921 - Topsoil and Seeding: Permanent turf for erosion control.

1.03 PERFORMANCE REQUIREMENTS

- A. The Contractor shall be responsible for implementing all conditions of the General Permit 3-9020 for Construction Activities. Refer to Special Conditions for further information.
- B. Comply with all requirements of Maine Erosion & Sediment Control Best Management Practices, 2016, from the Maine Department of Environmental Protection.
- C. Do not begin clearing, grading, or other work involving disturbance of ground surface cover until applicable permits have been obtained; furnish all documentation required to obtain applicable permits.
- D. Owner will withhold payment to Contractor equivalent to all fines resulting from non-compliance with applicable regulations.
- E. Timing: Put preventive measures in place as soon as possible after disturbance of surface cover and before precipitation occurs.
- F. Prevent runoff into storm and sanitary sewer systems, including open drainage channels, in excess of actual capacity or amount allowed by authorities having jurisdiction, whichever is less.

- G. Erosion On Site: Minimize wind, water, and vehicular erosion of soil on project site due to construction activities for this project.
 - 1. Control movement of sediment and soil from temporary stockpiles of soil.
 - 2. Prevent development of ruts due to equipment and vehicular traffic.
 - 3. If erosion occurs due to non-compliance with their requirements, restore eroded areas at no cost to Owner.
- H. Erosion Off Site: Prevent erosion of soil and deposition of sediment on other properties caused by water leaving the project site due to construction activities for this project.
 - 1. Prevent windblown soil from leaving the project site.
 - 2. Prevent tracking of mud onto public roads outside site.
 - 3. Prevent mud and sediment from flowing onto sidewalks and pavement.
 - 4. If erosion occurs due to non-compliance with these requirements, restore eroded areas at no cost to Owner.
- I. Sedimentation of Waterways Off Site: Prevent sedimentation of waterways off the project site, including river, streams, lakes, ponds, open drainage ways, storm sewers, sanitary sewers.
 - 1. If sedimentation occurs, install or correct preventative measures immediately at no cost to Owner; remove deposited sediments; comply with requirements of authorities having jurisdiction.
- J. Maintenance: Maintain temporary preventive measures until permanent measures have been established.

1.04 PROJECT REQUIREMENTS

- A. Take every reasonable precaution and do whatever is necessary to avoid any erosion and to prevent silting of rivers, streams, lakes, reservoirs, impoundments, and drainage ditches and swales.
- B. The exposure of uncompleted cut slopes, embankments, trench excavations, and site graded areas shall be kept as short as possible. Initiate seeding and other erosion control measured on each segment as soon as reasonably possible.
- C. Should it become necessary to suspend construction for any length of time, shape all excavated and graded areas in such a manner that runoff will be intercepted and diverted to points where minimal erosion will occur. Provide and maintain temporary erosion and sediment control measures, such as berms, dikes, slope drains, silt stops, and sedimentation basins, until permanent drainage facilities or erosion control features have been completed and are operative.
- D. Fine material placed or exposed during the work shall be so handled and treated as to minimize the possibility of its reaching any surface waters. Use diversion channels,

dikes, sediment traps, or any other effective control measures.

- E. Provide silt stops wherever erosion control measures may not be totally capable of controlling erosion, such as in drainage channels and where steep slopes may exist.
- F. Before water is allowed to flow in any ditch, swale or channel, install the permanent erosion control measures in the waterway so that the waterway will be safe against erosion.
- G. Take special precautions in the use of construction equipment to minimize erosion. Do not leave wheel tracks where erosion might begin.
- H. Unless specifically required in the Contract Documents, the operation of mechanized equipment in watercourses is not permitted. Where work is required in watercourses, minimize the movement of equipment in the waters and remove falsework, pilings, debris, and other temporary work as soon as construction will allow.
- I. Wherever crossing of live streams are necessary, provide temporary culverts or bridges to allow equipment to cross them without fording them. Disturbance of lands and waters outside the limits of construction is prohibited, except as may be found necessary and approved by Engineer.
- J. The requirements of this Section also apply to Project related construction activities away from the Project site, such as at borrow pits, off-site storage areas, and haul and work roads.
- K. Mulching shall follow the seeding operation by not more than 24 hours.
- L. Should any protective measures employed indicate any deficiencies or erosion taking place, immediately provide additional materials or employ different techniques to correct the situation and to prevent subsequent erosion.
- M. Continue erosion control measures until the permanent measures have been sufficiently established and are capable of controlling erosion on their own.
- N. Comply with all Federal, State, and Local laws, ordinances, rules and regulations.
- O. Provide the Resident Engineer with a written plan of erosion control for the entire contract area.

1.05 SUBMITTALS

- A. Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Certificate: Mill certificate for silt fence fabric attesting that fabric and factory seams comply with specified requirements, signed by legally authorized official of manufacturer; indicate actual minimum average roll values; identify fabric by roll identification numbers.
- C. Inspection Reports: Submit report of each inspection; identify each preventive measure, indicate condition, and specify maintenance or repair required and accomplished.

1.06 QUALITY ASSURANCE

- A. Provide at least one person who shall be present at all times during erosion control operations and who shall be thoroughly familiar with the types of materials being installed and the best methods for their installation and who shall direct all work performed under this Section.
- B. Material manufacturers and vendors shall be reputable, qualified firms regularly engaged in producing the required types of materials.
- C. Protect and maintain all areas disturbed by the Work, such that erosion is adequately controlled and silt and sediments are not allowed to flow into any watercourse, onto adjacent property, or into storm drains.

PART 2 PRODUCTS

2.01 HAY AND STRAW MULCH

- A. General - Hay and straw mulches shall be reasonably free from swamp grass, weeds, twigs, debris and other deleterious material, and free from rot, mold, primary noxious weed seeds, and rough or woody materials. Mulches containing mature seed of species which would volunteer and be detrimental to the permanent seeding, or would result in over seeding, or would produce growth which is aesthetically displeasing, is not permitted.
- B. Hay Mulch - Properly aired native hay, Sudan grass hay, broomsedge hay, legume hay, or similar hay or grass mowings. When air-dried in the loose state, the contents of the representative bale shall lose not more than fifteen (15) percent of the resulting air-dry weight of the bale.
- C. Straw Mulch - Threshed plant residue of oats, wheat, barley, rye or rice from which grain has been removed.
- D. Mulch Stabilizers - "Curasol" applied at a rate of 40 gal/Ac, Dow "Mulch Binder" applied at a rate of 45 gal/Ac, or asphalt binder, AASHTO M140, Type SS-1 or RS-1 as applicable, applied at the rate of 4000 gal/Ac.
- E. Temporary Type Mulch Nets - Paper yarn, approximately 0.05 inches in diameter, woven into a net with approximately openings of 7/8 inches by 1/2 inches and weighing about 0.20 lbs/sy.
- F. Permanent Type Mulch Nets - "Vexar" or "Erosion-Net" plastic or nylon mesh netting with approximately openings of 3/8 inches or 3/4 inches.

2.02 MATTING/BLANKETS

- A. Nomenclature - The various materials under this Paragraph are sometimes referred to as "matting" and "blankets". These words are interchangeably used throughout this Section, but the meanings shall be the same.
- B. Jute Matting - Undyed and unbleached jute yarn woven into a uniform open, plain weave mesh, furnished in rolled strips conforming to the following physical

requirements:

- Width -48 inches, plus or minus 1 inch
 - 78 warp ends per width of cloth
 - 41 weft ends per yard
 - Weight -1.22-1.80 lbs/ly, plus or minus 5%
- C. Excelsior Matting - Uniform web of interlocking wood excelsior fibers with a backing of mulchnet fabric on one side only. The mulchnet shall be woven of either twisted paper chord or cotton cord. Excelsior matting shall be furnished in rolled strips and shall conform to the following physical requirements.
- Width -36 inches, plus or minus 1 inch
 - Weight -0.80 lbs/sy, plus or minus 5%
- D. Soil Erosion Matting - "Enkamat Type 7020" by American Enka Company, or approved equal.
- E. Erosion Control Mulching Blanket - "Hold/Gro" by Gulf States Paper Corp., or approved equal.
- F. Staples - No. 11 (or heavier) plain iron wire, made from at least 12 inch lengths of wire bent to form a "U" of 1-1/2 inches to 2 inches in width. Use longer staples for loose soils or where otherwise required.

2.03 SEED AND SOD FOR EROSION CONTROL

- A. Select a species appropriate to climate, planting season, and intended purpose. If same area will later be planted with permanent vegetation, so not use species known to be excessively competitive or prone to volunteer in subsequent seasons.
- B. For Temporary Control Use - annual or perennial ryegrass.
- C. For Permanent Control - See Section TOPSOIL AND SEEDING.

2.04 SILT FENCES

- A. Polypropylene geotextile resistant to common soil chemicals, mildew, and insects; non-biodegradable; in longest lengths possible; fabric including seams with the following minimum average roll lengths.
- B. Manufacturers as shown in detail on Drawings.
- C. Approved equivalent shall meet the following:
1. Average Opening Size: 30 U.S. Std. Sieve (0.600 mm), maximum, when tested in accordance with ASTM D 4751.
 2. Permittivity: 0.05 sec^{-1} , minimum, when tested in accordance with ASTM D 4491.
 3. Ultraviolet Resistance: Retaining at least 70 percent of tensile strength, when tested in accordance with ASTM D 4355 after 500 hours exposure.

4. Tensile Strength: 100 lb-f (450 N), minimum, in cross-machine direction; 124 lb-f (550 N), minimum, in machine direction; when tested in accordance with ASTM D 4632.
 5. Elongation: 15 to 30 percent, when tested in accordance with ASTM D 4632.
 6. Tear Strength: 55 lb-f (245 N), minimum, when tested in accordance with ASTM D 4533.
- C. Silt Fence Posts: One of the following, minimum 5 feet (1500 mm) long.
1. Hardwood, 2 by 2 inches (50 by 50 mm) in cross section.

2.05 RIPRAP

- A. See Section 31 2373.

2.06 CHECK DAMS AND SEDIMENT BASINS

- A. Reference drawings.

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 PREPARATION

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

3.03 SCOPE OF PREVENTATIVE MEASURES

- A. In all cases, if permanent erosion resistant measures have been installed temporary preventive measures are not required.
- B. Construction Entrances: Traffic-bearing aggregate surface.
1. Provide at each construction entrance from public right-of-way.
 2. Where necessary to prevent tracking of mud onto right-of-way, provide wheel washing area out of direct traffic land, with drain into sediment trap or basin.
 3. See detail on Drawings for dimensions and construction specifications.
- C. Linear Sediment Barriers: Made of silt fences.
1. Provide linear sediment barriers:
 - a. Along downhill perimeter edge of disturbed areas, including soil stockpiles.
 - b. Along the top of the slope or top bank of drainage channels and swales that transverse disturbed areas.
 - c. Along the toe of cut slopes and fill slopes.

2. Space sediment barriers with the following maximum slope length upslope from barriers:
 - a. Slope of less than 2 percent: 100 feet (30 m).
 - b. Slope between 2 and 5 percent: 75 feet (23 m).
 - c. Slope between 5 and 10 percent: 50 feet (15 m).
 - d. Slope between 10 and 20 percent: 25 feet (7.5 m).
 - e. Slope over 20 percent: 15 feet (4.5 m).
- D. Storm Drain Curb Inlet Sediment Trap: See details on Drawings.
- E. Temporary Splash Pads: Stone aggregate over filter fabric; size to suit application; provide at downspout outlets and stormwater outlets.
- F. Soil Stockpiles: Protect using one of the following measures:
 1. Cover with polyethylene film, secured by placing soil or other anchoring devices on outer edges.
- G. Mulching: Use only for areas that may be subjected to erosion for less than 6 months.
- H. Temporary Seeding: Use where temporary vegetated cover is required.

3.04 INSTALLATION

A. HAY AND STRAW MULCHING

1. Install hay or straw mulch immediately after each area has been properly prepared. When permanent seed or seed for temporary erosion control is sown prior to placing the mulch, place mulch on seeded areas within 24 hours after seeding. Engineer may authorize the blowing of chapped mulch provided that 95% of the mulch fibers will be 6 inches or more in length and that it can be applied in such a manner that there will be a minimum amount of matting that would retard the growth of plants. Hay mulch should cover the ground enough to shade it, but the mulch should not be so thick that a person standing cannot see the ground through the mulch. Remove matted mulch or branches.
2. Where mild winds may blow the mulch, or when ground slopes exceed 15%, or when otherwise required to maintain the mulch firmly in place, apply a system of pegs and strings, a chemical stabilizer, or temporary type netting to the mulch. Unless otherwise directed, remove the stings and netting prior to the acceptance of the Work.
3. Where high winds exist, or heavy rainstorms are likely, or where ground surfaces are steep, or where other conditions require, apply temporary type netting over the mulch and take whatever measures are necessary to maintain the mulch firmly in place.

4. Unless otherwise specified, the use of permanent type netting is not permitted without the prior approval of Engineer.

B. MATTING/BLANKETS - GENERAL

1. The use of mulch with matting is not permitted, however, a 4 to 6 inch overlap of mulch over the edge of matting is permissible.
2. Prepare surfaces of ditches and slopes to conform to the grades, contours and cross sections shown on the Drawings and finish to a smooth and even condition with all debris, roots, stone, and lumps raked out and removed. Loosen the soil surface to permit bedding of the matting. Unless otherwise noted, place seed prior to the placement of the matting.
3. Unroll matting parallel to the direction of flow of water and loosely drape, without folds or stretching, so that continuous ground contact is maintained.
4. In ditches and swales, and on slopes, each upslope and each downslope end of each piece of matting shall be placed in a 6 inch trench, stapled at 12 inches on center, backfilled, and tamped. Similarly, bury edges of matting along the edges of catch basins and other structures. Engineer may require that any other edge, exposed to more than normal flow of water, be buried in a similar fashion.
5. Tightly secure matting to the soil by staples driven approximately vertically into the ground, flush with the surface of the matting. In driving the staples, take care not to form depressions or bulges in the surface of the matting.
6. Decrease the specified spacing of staples when varying factors, such as the season of the year or the amount of water encountered or anticipated, requires additional anchoring.
7. Refer to the following paragraphs for additional requirements on the placement of matting and stapling.

C. JUTE MATTING

1. Where strips are laid parallel or meet, as in a tee, they shall be overlapped at least 4 inches. Overlap ends at least 6 inches, shingle fashion.
2. Space check slots, built at right angles to the direction of flow of water, so that one check slot or one end occurs within each 50 feet of length of slope. Construct check slots by placing a tight fold of matting at least 6 inches vertically into the ground. These shall be tamped the same as the upslope ends.
3. Press jute matting onto the ground with a light lawn roller or other satisfactory means.
4. On slopes flatter than 4:1, place staples not more than 3 feet apart in three rows, for each strip, with one row along each edge and one row alternately spaced down the center. On grades 4:1 or steeper, place staples in the same

three rows, but spaced 2 feet. On lapping edges, double the number of staples, with the spacing halved. Ends of matting and all required check slots shall have staples placed every foot. Matting placed adjacent to boulders or other obstructions shall be stapled with no spaces between the staples.

5. Spread additional seed over jute matting, particularly those locations disturbed by the building of slots.

D. EXCELSIOR MATTING

1. Where strips of excelsior matting are laid end to end, abut the adjoining ends.
2. When adjoining rolls of excelsior matting are laid parallel to one another, abut the matting snugly.
3. One slopes flatter than 4:1, place staples not more than 3 feet apart in three rows, for each strip, with one row along each edge and one row alternately spaced down the center. One grades 4:1 or steeper, place staples in the same three rows, but spaced 2 feet. Ends of matting shall have staples placed every foot. Matting placed adjacent to boulders or other obstructions shall be stapled with no spaces between the staples.

E. EROSION CONTROL MULCHING BLANKET

1. Where one roll ends and a second roll begins, the upslope piece shall be brought over the end of the downslope roll so that there is a 12 inch overlap, placed in a 4 inch deep trench, stapled at 12 inches on center, backfilled and tamped.
2. On slopes where two or more widths of blankets are applied, the two edges shall be overlapped 4 inches and stapled at 12 inch intervals along the exposed edge of the lap joint.
3. Staple the body of the blanket in a grid pattern with staples 3 feet on center, each way.

F. SEED FOR EROSION CONTROL

1. Seeding for permanent erosion control shall be carried out in accordance with Section TOPSOIL AND SEEDING.
2. Areas which will be regraded or otherwise disturbed later during construction may be ordered to be seeded with rye grass to obtain temporary control. The seed shall be sown at the rate of approximately one pound per 1,000 square feet, on the pure live seed basis.

G. SILT FENCES

1. Provide silt fences, as required, for the temporary control of erosion and to stop silt and sediment from reaching surface waters, adjacent properties, or entering catch basins, or damaging the Work.

2. Erect silt fences and bury bottom edge in accordance with the manufacturer's recommended installation instructions. Provide a sufficient length of fence to accommodate runoff without causing any flooding and to adequately store any silt, sediment, and debris reaching it.
3. Leave silt fences in place until permanent erosion control measures have stopped all erosion and siltation.

3.05 MAINTENANCE

- A. If any staples become loosened or raised, or if any matting becomes loose, torn or undermined, or if any temporary erosion and sediment control measures are disturbed, repair them immediately.
- B. If seed is washed out before germination, repair any damage, refertilize, and reseed.
- C. Maintain mulched and matted areas, silt stops, and other temporary control measures until the permanent control measures are established and no further erosion is likely.

END OF SECTION

SECTION 31 2310

SITE GRADING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Removal and storage of topsoil.
- B. Rough grading the site.
- C. Finish grading.
- D. Filling
- E. Riprapping
- F. Construction of embankments.

1.02 RELATED REQUIREMENTS

- A. Section 01 4000 - Quality Requirements.
- B. Section 31 2230 - Clearing and Grubbing.
- C. Section 31 2250 - Soil Compaction.
- D. Section 31 2270 - Erosion control.
- E. Section 31 2315 - Excavation.
- F. Section 31 2316 - Fill and Backfill: Filling and compaction.
- G. Section 31 2317 - Trenching for Site Utilities: Trenching and backfilling for utilities.
- H. Section 31 2318 - Rock Removal.
- I. Section 32 2901 - Restoration of Surfaces.
- J. Section 32 2921 - Topsoil and Seeding: Finish ground cover.

1.03 SUBMITTALS

- A. Section 01 3000 - Administrative Requirements
- B. Certified copies of all results of maximum density tests and field compaction density tests.
- C. Gradations of stone, gravel, and other materials proposed for use.
- D. Project Record Documents: Accurately record actual locations of utilities remaining by horizontal dimensions, elevations or inverts, and slope gradients.

1.04 QUALITY ASSURANCE

- A. All finished grades shall be as shown on the Drawings. Use a qualified surveyor to set all grade stakes and to ensure that the resulting final grades are those which are

required.

- B. When placing fill or constructing embankments, moisten or dry fill material to the proper moisture content as determined by ASTM D1557, Method C.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Delivery of borrow materials to the site or removal of spoil from the site shall be done in a manner which will not cause any nuisance or allow spillage of materials from the transporting vehicle.
- B. Store topsoil separately from all other excavated materials and preserve for reuse.
- C. Materials which are required to be stored shall be stored in an orderly manner and at a sufficient distance away from banks of excavations and trenches to avoid overloading and percent slides or cave-ins. Do not store materials on, over or adjacent to structures or utilities which may collapse due to the added weight.
- D. Promptly remove materials not specified to be stored or reused.
- E. Obstruction of roads, driveways, sidewalks or interference with drainage along gutters, ditches or drainage channels with stored material is not permitted. If materials cannot be stored at the site to avoid such obstructions and interferences, they shall be stored away from the site and brought back when and as needed.

1.06 PROJECT CONDITIONS

- A. Protect above- and below-grade utilities that remain.
- B. Protect plants, lawns, rock outcroppings, and other features to remain as a portion of final landscaping. These features are shown on Contract Drawings.
- C. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from grading equipment and vehicular traffic.
- D. Keep ground surfaces well drained, but avoid erosion. Do not place fill in water or over ice or snow.
- E. Filling with frozen materials or when materials already in place are frozen, is not permitted.

1.07 SCHEDULING AND SEQUENCING

- A. Schedule the Work with Engineer and afford her/him adequate time and space to make all required inspections.
- B. Schedule work and coordinate operations with the approved testing laboratory. If the laboratory cannot be available to perform required tests, grading and filling operations may have to be delayed in order to accomplish certain field tests.

PART 2 PRODUCTS

2.01 FILL MATERIAL

- A. Topsoil: See Section 32 2921.

- B. Other Fill Materials: See Section 31 2316.

2.02 RIPRAP

- A. See Section 31 2373
- B. Stone for riprap shall be approved, rough, unhewn quarry stone, as nearly rectangular in section as practicable. The stones shall be hard, sound and resistant to the action of water and weathering. They shall be of a rock type other than serpentine rock containing the fibrous variety chrysotile (asbestos) and suitable in every respect for the purpose intended.
 1. Heavy Type. The individual stones shall have a depth equal to the thickness of the course of riprap. At least 75 percent of the volume of the riprap, complete in place, shall consist of stones that have a minimum volume of 16 cubic feet.
 2. Light Type. The individual stones shall have a depth equal to the thickness of the course of riprap. The riprap, complete in place, shall consist of stones that have a minimum volume of 1/2 cubic foot.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that all boundaries of temporary and permanent easements and property lines are clearly marked in the field and that the Work will not violate these boundaries.
- B. Verify that the clearing and grubbing operations have been completed.
- C. Ascertain and verify the locations and character of structures, underground lines and subsurface conditions and verify that the Work will not adversely affect them.
- D. Verify that grade stakes have been properly and accurately set.
- E. Do not begin operations until conditions are satisfactory.

3.02 STRIP AND STOCKPILE TOPSOIL

- A. Strip topsoil to its full depth within all areas to be excavated or graded and in areas to receive pavements, fills or embankments except where existing ground is to be left undisturbed.
- B. Store topsoil on-site, in storage piles. Keep topsoil separated from all other excavated materials and store free of roots or other desirable materials.

3.03 DISPOSAL OF MATERIALS

- A. Use approved on-site materials to the extent they are available. Promptly dispose of any excess materials, off-site.
- B. Remove from the site all unsuitable material. Do not store or stockpile unsuitable materials at the Project site and do not incorporate into the Work.

3.04 SITE GRADING

- A. Rough grade the portions of the site which must be raised or lowered in order to properly execute the work under other Sections.
- B. Uniformly grade the site to the lines, grades and elevations shown on the Drawings. Finished surfaces shall be reasonably smooth, compacted and free from irregular surface changes. Unless otherwise specified, the finish shall be equivalent to the ordinarily obtainable from either blade grader or scraper operations.
- C. In unpaved areas, except those to be ripped, lined or specially treated, smooth the surface sufficiently for application of topsoil. The finished topsoil subgrade shall not be more than 1 inch above or below the established grade or cross section.
- D. In unpaved areas, the finished grades shown on the Drawings include a layer of topsoil. The thickness of the topsoil is specified on the Drawings.

3.05 ROUGH GRADING

- A. Remove topsoil from areas to be excavated for sanitary sewer alignments, without mixing with foreign materials.
- B. Do not remove topsoil when wet.
- C. Remove subsoil from areas to be further excavated, re-landscaped, or re-graded.
- D. Do not remove wet subsoil, unless it is subsequently processed to obtain optimum moisture content.
- E. When excavating through roots, perform work by hand and cut roots with sharp axe.
- F. Benching Slopes: Horizontally bench existing slopes greater than 1:4 to key fill material to slope for firm bearing.
- G. Stability: Replace damaged or displaced subsoil to same requirements as for specified fill.

3.06 EMBANKMENT CONSTRUCTION

- A. Level off surfaces upon which embankments are to be constructed. Where existing ground is left undisturbed, plow or disk the Surface and mix it in with the first layer of embankment material to provide a satisfactory bond.
- B. Ground surfaces sloped steeper than 1 vertical to 4 horizontal shall be plowed, stepped or broken up to permit bonding of the embankment with the existing surface.
- C. Uniformly place and spread fill in successive horizontal layers not more than 1 foot in compacted depth.
- D. Compact each layer of fill to a minimum density of 90%.

3.07 PREPERATION OF PAVEMENT SUBBASES

- A. Shape the entire subbase to the required line, grade and cross section. Remove and dispose of all soft and unsuitable material and replace with an approved material. Remove and dispose of all boulders and ledge rock. Break off to a depth of not less

than 6 inch below the subbase. Fill resulting depressions with an approved material.

- B. Roll subbase to achieve the required compaction densities specified in Section 31 2250. Reshape, wet and aerate subbase, as required. Compact the entire width of the area to receive pavement, plus the areas within 5 feet of and parallel and adjacent to the edges of the pavement. Compact the full depth of embankments to the required density. Where cuts are encountered, thoroughly roll and compact until no further consolidation is apparent.
- C. When pavements cannot be placed immediately after the preparation of the subbase, the entire subbase shall be reshaped and compacted to the required line, grade and cross section.
- D. After rolling, the surface of the subbase shall not show any deviation in excess of 3/4 inch when tested with a 10 foot straightedge applied both parallel to and at right angles to the centerline of the area. The elevation of the finished subbase shall not vary more than 0.50 feet from the established grade and cross section.
- E. Do not disturb the finished subbase by traffic or other operations and protect and maintain in a satisfactory condition until the overlaying pavement is placed.

3.08 SUBBASE AND EMBANKMENT PROTECTION

- A. Keep the embankments and excavations shaped and well drained. Where ruts or erosion occur, add additional fill and reshape and recompact before placing paving materials.
- B. The storage or stockpiling of material on prepared subbases is not permitted.
- C. All subbases will be inspected by Engineer and paving materials shall not be placed prior to receipt of Engineer's approval. The placing of pavement materials on a muddy, spongy, weaving or frozen subbase is not permitted.

3.09 DITCHES - SWALES

- A. Accurately cut ditches and swales to the required cross sections and grades. Cut off all roots, stumps, rock and foreign matter, in the sides and bottoms of ditches and swales, to conform to the required slope, grade and shape.
- B. Maintain ditches and swales at all times so that they effectively drain. Refill, reshape and recompact where ruts or erosion occurs.

3.10 DUMPED RIPRAP

- A. Place riprap in a manner so as to produce a reasonably well graded mass of rock with the minimum practicable percentage of voids. The finished stone surface shall be free from objectionable pockets of smaller stones and clusters of larger stones.
- B. Placing stones in layers or dumping by methods likely to cause segregation of the various sizes is not permitted. Obtain the desired distribution of the various sized stones by selective loading, controlled dumping of successive loads or by other approved means.

- C. Completely fill voids with fine stone or gravel. Rearrange stones by mechanical equipment or by hand to the extent necessary to obtain a reasonably well graded distribution.
- D. The final stone surface shall not exceed 3 inches, plus or minus, from the required grades and elevations. Leave riprap in a stable mass.

3.11 STONE SLOPE PROTECTION

- A. Place stone to the depth, grade, line and cross section shown on the Drawings. The finished stone surface shall be free from objectionable pockets smaller stones and clusters of larger ones.
- B. Carefully dump and grade stone to the extent necessary to obtain a reasonably smooth, stable and well graded distribution with the minimum practicable percentage of voids.

3.12 FIELD QUALITY CONTROL

- A. Soils testing shall be performed by the approved independent testing laboratory in accordance with Section 02250 - Soil Compaction
- B. Engineer will establish the date, time, location, number, and types of soils tests required.

END OF SECTION

SECTION 31 2315

EXCAVATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Excavating for the installation of underground lines, structures and foundations.

1.02 RELATED REQUIREMENTS

- A. Section 01 7000 - Execution Requirements: General requirements for dewatering of excavations and water control.
- B. Section 31 2230 - Clearing and Grubbing
- C. Section 31 2250 - Soil Compaction
- D. Section 31 2310 - Site Grading: Soil removal from surface of site.
- E. Section 31 2316 - Fill and Backfill: Fill materials, filling, and compacting.
- F. Section 31 2317 - Trenching for Site Utilities: Excavating for utility trenches outside the building.
- G. Section 31 2318 - Rock Removal: Removal of rock during excavating.
- H. Section 31 2501 - Dewatering
- I. Section 32 2901 - Restoration of Surfaces

1.03 DEFINITIONS

- A. Solid Rock, Loose Rock, Common Excavation and Rock Excavation - Defined in Section 31 2318.
- B. Common Excavations - Removal and disposition of all materials, except solid rock, which are encountered within the required widths and depths of excavation.

1.04 SUBMITTALS

- A. Section 01 3000 - Administrative Requirements

1.05 QUALITY ASSURANCE

- A. Unless otherwise specified, or approved by Engineer in writing, tunneling is not permitted.
- B. Do not restrict access to any private road or driveway for more than one hour. Provide and maintain suitable temporary crossing over open ditches where required to meet this condition.
- C. When excavating in or adjacent to roads or existing facilities, take whatever measures

are necessary to protect the road surfaces and/or from becoming undermined.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Store topsoil separately from all other excavated materials on the site and preserve for reuse.
- B. Store excavated materials meeting the requirements for backfill in an orderly manner at a sufficient distance away from banks of excavations and trenches to avoid overloading and to prevent slides or cave-ins. Do not store materials on, over or adjacent to structures or utilities which may collapse or become damaged due to promptly and dispose of away from the site.
- C. Promptly remove materials not specified to be stored or reused.
- D. Obstruction of roads, driveways, sidewalks or interferences with drainage along gutters, ditches or drainage channels with stored material is not permitted. If materials cannot be stored at the site to avoid such obstructions and interferences, they shall be stored away from the site and brought back when and as needed.
- E. No construction activity, access, storage or other use shall take place beyond the construction easement boundaries. Engineer may require Contractor to install and maintain snow fences along the boundaries, where such boundaries could be violated.

1.07 PROJECT CONDITIONS

- A. Verify that survey bench mark and intended elevations for the Work are as indicated.
- B. Protect plants, lawns, and other features to remain.
- C. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, curbs, and utilities from excavating equipment and vehicular traffic.
- D. Maintain excavations free of groundwater, sewage, stormwater, ice and snow during the progress of the Work and until the finished work is safe from injury.
- E. Protect subgrades against freezing by means of insulated blankets, salt hay or other methods.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Wood Sheeting and Bracing - Sound timber, free from defects which might impair its strength and effectiveness.
- B. Steel Sheeting and Bracing - ASTM A328.

PART 3 EXECUTION

3.01 EXCAVATING

- A. Excavate for structures to the elevations indicated on the Drawings and extend a sufficient distance from foundation walls, piers and footings to provide adequate

clearances for construction operations, including sheeting and bracing, if required, and for inspection purposes.

- B. Trim approximately the last four inches of foundation subgrades, in earth, by hand just prior to the placement of concrete or concrete reinforcement.

3.02 SHEETING AND BRACING

- A. Provide and maintain adequate sheeting and bracing as required for the safety and protection of the Work, persons and adjacent property and structures in accordance with Federal, State, and Local laws, codes, ordinances, and standards.
- B. Engineer may, at his discretion, order sheeting and bracing to be cut-off and left-in-place. Where, in the opinion of Contractor, damage may result from withdrawing sheeting, he shall immediately notify Engineer for verification. Sheeting ordered left-in-place adjacent to piping shall be cut off not less than 12" over the top sheeting and bracing.
- C. Contractor is fully responsible for the design and construction of all sheeting and bracing used and for all damages resulting from improper quality, strength, placing, maintenance or removal of sheeting and bracing.

3.03 UNSTABLE MATERIALS

- A. Remove unstable materials in excavations and trench bottoms, which are incapable of supporting pipes or structures, to the extent and depths directed by Engineer, and properly dispose of off-site. Refill and compact the excavation or trench as required, with Granular Fill, Stone Fill or concrete, as directed by Engineer.
- B. Whenever the material encountered is, in Contractor's opinion, incapable of providing adequate support, he shall immediately notify the Engineer for verification. Make measurements, for payment purposes, in Engineer's presence.

3.04 DISPOSAL OF EXCAVATED MATERIALS

- A. Excavated materials which meet the requirements for embankment fill or backfill may be used for constructing embankments and backfilling, as applicable. Remove excess excavated materials and dispose off-site.
- B. Load and remove unsuitable materials and dispose off-site. The storing or stockpiling of unsuitable material is not permitted and such material shall be loaded directly from the excavation onto trucks.
- C. The Contractor shall be responsible for all costs of loading, hauling, dumping, and otherwise transporting and disposal of all excess excavated/unsuitable materials, including the requirement to identify appropriate disposal areas, and obtaining any permits associated with disposal. It is noted that the Owner may be interested in receiving clean excess excavated materials at the site of the Town Landfill.

3.05 PROTECTION

- A. Prevent displacement of banks and keep loose soil from falling into excavation; maintain

soil stability.

- B. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.

END OF SECTION

SECTION 31 2316

FILL AND BACKFILL

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Filling, backfilling, and compacting for paving, site structures, and utilities.
- B. Backfilling and compacting for utilities outside the building to utility main connections.
- C. Filling holes, pits, and excavations generated as a result of removal (demolition) operations.

1.02 RELATED REQUIREMENTS

- A. Section 31 2310 - Site Grading
- B. Section 31 2315 - Excavation: Removal and handling of soil to be re-used.
- C. Section 31 2317 - Trenching for Site Utilities: Excavating for utility trenches outside the building.
- D. Section 32 2901 - Restoration of Surfaces

1.03 DEFINITIONS

- A. Earth - Clay, loam, sand, gravel, topsoil and other materials not classified as solid rock or loose rock.
- B. Common Earth - Clay, loam, sand, gravel, topsoil and similar materials which may contain some stones, pebbles, lumps and rock fragments up to 6" in largest dimension, but does not contain debris and frozen material.
- C. Select Earth - Sand, gravel and similar materials which may contain small amounts of stones, pebbles or lumps over 1" in largest dimension, but none over 2" in largest dimension, but does not contain clay, loam, organic material, debris and frozen material.
- D. Crushed Stone – Washed 3/4" crushed stone meeting the requirements of 2020 MDOT Standard Specification 703.13 Crushed Stone 3/4-inch. "
- E. Select Fill - Consists of Select Earth, imported sand or other granular materials as approved by Engineer.

- F. Sand Bedding - Sand conforming to ASTM C33, Fine aggregate.
 Gradation: Passing #4 Sieve = 100%
 Passing #200 Sieve = 0-20%
- G. Earth Overburden - Earth overlying solid rock and in place during blasting operations or earth no classified as Select or Common Earth.
- H. Unstable Material - Debris, frozen materials, topsoil, quicksand and all wet, soft or loose material which does not provide sufficient bearing capacity to satisfactorily support pipes or other work.
- I. Unsuitable Material - Excavated material which does not meet requirements for backfilling purposes and includes solid and loose rock, earth overburden and unstable material.
- J. Topsoil - Surface layer of soil and sod suitable for use in seeding and planting and not containing debris, subsoil, stumps, roots, brush, stones, clay lumps and similar objects greater than 2" in largest dimension and material toxic to plant growth.
- K. Paved Areas - The area which lies directly under a paved surface, whether it be asphalt, concrete, or other paving materials.
- L. Bank Run Gravel - Satisfactorily graded, free draining, hard, durable stone and coarse sand reasonably free from silt, loam, clay and organic matter.
 Gradation: Passing 2" Sieve= 95-100%
 Passing #4 Sieve = 40-70%
 Passing #100 Sieve = 5-20%
 Passing #200 Sieve = 4-8%
 (Maximum size of 6")
- M. Screened Gravel - Uniformly graded, clean, hard, and durable particles free from an excess of soft, thin, elongated, laminated, or disintegrated pieces and be free from silt, loam, clay or organic matter.
 Gradation: Passing 1½" Sieve = 100%
 Passing ¾" Sieve = 90-100%
 Passing ⅜" Sieve = 0-30%
 Passing #4 Sieve = 0-5%
- N. Crushed Gravel/Granular Fill - Uniformly graded and free of silt, loam, clay or organic matter.
 Gradation: Passing 2" Sieve= 100%
 Passing #4 Sieve = 40-70%

Passing #100 Sieve	=	5-20%
Passing #200 Sieve	=	4-8%

(Max. 5% passing #200 sieve for material designated as "frost free")

- O. Granular Borrow: Fill to raise grades in building areas and backfill for over-excavations, or to repair soft areas shall be sand or silty sand meeting the requirements of 2020 MaineDOT Standard Specification 703.19 Granular Borrow.
- P. Structural Fill: Fill to raise grades in building areas and backfill for foundations, over-excavated areas and slab base material shall be clean, non-frost susceptible sand and gravel meeting the gradation of Structural Fill given below:

Gradation:	Passing 4" Sieve	=	100%
	Passing 3" Sieve	=	90-100%
	Passing 1/4" Sieve	=	25-90%
	Passing #40 Sieve	=	0-30%
	Passing #200 Sieve	=	0-6%

1.04 REFERENCE STANDARDS

- A. AASHTO T 180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54 kg (10-lb) Rammer and a 457 mm (18 in.) Drop; American Association of State Highway and Transportation Officials; 2010.
- B. ASTM C 136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates; 2006.
- C. ASTM D 698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)); 2007.
- D. ASTM D 1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method; 2007.
- E. ASTM D 1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN m/m³)); 2009.
- F. ASTM D 2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method; 2008.
- G. ASTM D 2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System); 2006.
- H. ASTM D 2922 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth); 2005.
- I. ASTM D 3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth); 2005.
- J. ASTM D 4318 - Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index

of Soils; 2005.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Certified copies of all results of moisture-density tests and field compaction density tests.
- C. Gradations of Stone Bedding, Stone Fill, Sand Bedding, Bank Run Gravel, Screened Gravel, and Crushed Gravel/Granular Fill.
- D. Gradations of other material proposed for use in the work.
- E. Copies of measurements and computed volumes of unstable material removed.
- F. Certification from testing laboratory that crushed gravel under-drain material meets permeability requirements at required compaction.
- G. Compaction Density Test Reports.

1.06 QUALITY ASSURANCE

- A. Moisten or dry backfill to the proper moisture content as determined in accordance with ASTM D1557, Method C.
- B. All subgrades shall be approved by Engineer before pipes or structures are installed or concrete is placed.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Store topsoil separately from all other excavated materials on the site and preserve for reuse.
- B. Promptly remove materials not specified to be stored or reused.
- C. Obstruction of roads, driveways, sidewalks or interferences with drainage along gutters, ditches or drainage channels with stored material is not permitted. If materials cannot be stored at the site to avoid such obstructions and interferences, they shall be stored away from the site and brought back when and as needed.
- D. No construction activity, access, storage or other use shall take place beyond the construction easement boundaries. Engineer may require Contractor to install and maintain snow fences along the boundaries, where such boundaries could be violated.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. When necessary, store materials on site in advance of need.
- B. Verify that survey bench marks and intended elevations for the Work are as indicated.
- C. Backfilling with frozen materials or when materials already in place are frozen is not permitted.

1.09 SCHEDULING AND SEQUENCING

- A. Do not backfill until the following conditions are met:
 - 1. Concrete - See Division 3 for the time required after the placement of concrete.
 - 2. Manholes - See Section 33 2601 which requires that specific manholes be given and pass leakage tests prior to backfilling.
 - 3. Mortar Plaster and Masonry - Mortar has set, but no sooner than three days after the mortar was applied.
 - 4. Dampproofed, Waterproofed, and Coated Surfaces - Only after materials have properly cured.
 - 5. Work in General - Engineer and testing laboratory have completed all inspections and tests.
- B. Except as noted above, or required by other Sections, or when approved or directed by Engineer, backfill pipe and cable excavations within one day after installation. Backfill other excavations as soon as possible after all inspections and tests have been completed.

PART 2 PRODUCTS

2.01 FILL MATERIALS

- A. Backfill - General - To the extent suitable materials are available, backfill shall consist of excavated material. Where excavation does not provide sufficient approved material, import additional materials from off site.

2.02 SOURCE QUALITY CONTROL

- A. Where fill materials are specified by reference to a specific standard, test and analyze samples for compliance before delivery to site.
- B. If tests indicate materials do not meet specified requirements, change material and retest.
- C. Provide materials of each type from same source throughout the Work.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Identify required lines, levels, contours, and datum locations.
- B. See Section 31 2310 for additional requirements.
- C. Verify subdrainage, dampproofing, or waterproofing installation has been inspected.
- D. Verify structural ability of unsupported walls to support imposed loads by the fill.
- E. Verify underground tanks are anchored to their own foundations to avoid flotation after backfilling.

3.02 PREPARATION FOR BACKFILLING

- A. Immediately prior to backfilling, remove all rubbish, debris, forms and similar materials from the excavation.
- B. Do not backfill until the conditions of Paragraph 1.09 are met.

3.03 BACKFILLING – GENERAL

- A. Fill shall be placed in horizontal lifts and compacted such that the desired density is achieved throughout the lift thickness with 3 to 5 passes of the compaction equipment. Loose lift thickness for grading, fill, and backfill activities shall not exceed 12 inches.

3.03 BACKFILLING TRENCHES

- A. 12 inches Over Pipes - Provide 12 inches of Select Fill over the top of the pipe as detailed on the Drawings. Place fill by hand in not greater than 6 inch layers. Bring Select Fill up evenly on both sides of pipes and carefully and thoroughly compact under the pipe haunches. Do not displace pipe.
- B. 12" Over Sand Encasement - Provide 12" of Select Fill over the top of the sand. Place fill by hand in not greater than 6" compacted layers.
- C. Remainder of Trench - Paved Areas - Select Fill, Select Earth, or Common Earth, placed in not greater than 6" compacted layers.
- D. Remainder of Trench - Other Areas - Select Earth, or Common Earth, placed in not greater than 12" compacted layers.

3.04 BACKFILLING AROUND STRUCTURES

- A. Uniformly spread and deposit Structural Fill in horizontal layers, not over 8" in compacted thickness. Take special precautions to prevent wedging actions against the walls.

3.05 STRUCTURAL FILL UNDER SLABS & FOOTINGS

- A. Prior to placing Structural Fill, all organic material, topsoil, debris and any other deleterious material shall be removed.
- B. Place material in maximum 8" lifts and compacted to 95% of maximum density at optimum moisture content as determined by ASTM D1557, Modified Proctor.
- C. If the materials density tests less than 95%, corrective action and additional testing will be required. The additional testing and corrective action will be paid for by the Contractor.
- D. Place materials in such a way as not to damage concrete foundations and footings.

3.06 TOP OF BACKFILL

- A. Paved Areas - Carry backfill up to pavement subgrade, ready to receive pavement. If paving is to be done at a later date, carry backfill up so as to provide slightly mounded surface with edges flush with the existing pavement surface.
- B. Unpaved Areas - Carry backfill up to adjacent finished grade, minus the depth of any

required topsoil or topsoil and sod finish, and so as to provide a finished surface slightly mounded over the trench.

- C. Cover over Pipe - Immediately notify Engineer when the depth of cover over any pipe is less than 5'.

3.07 COMPACTION REQUIREMENTS

- A. See Section 31 2250.

3.08 FIELD QUALITY CONTROL

- A. Soils testing shall be performed by the approved independent testing laboratory in accordance with Section 31 2250 - Soil Compaction.
- B. Engineer will establish the date, time, location, number, and types of soils tests required.

3.09 ADJUST AND CLEAN

- A. Any trenches or excavations which have been backfilled and show any evidence of settlement or being improperly backfilled, or have been tested and failed, shall be re-excavated to the depth required for proper compaction and then properly refilled and compacted.
- B. Replace or repair any pipe or structure which has been damaged or displaced.

END OF SECTION

SECTION 31 2317

TRENCHING FOR SITE UTILITIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Trenching for the installation of underground lines, structures and foundations.

1.02 RELATED REQUIREMENTS

- A. Section 31 2310 - Site Grading
- B. Section 31 2315 - Excavation
- C. Section 31 2316 - Fill and Backfill
- D. Section 31 2318 - Rock Removal: Removal of rock during excavating.

1.03 REFERENCES

- A. AASHTO T 180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54 kg (10-lb) Rammer and a 457 mm (18 in.) Drop; American Association of State Highway and Transportation Officials; 2010.
- B. ASTM C 136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates; 2006.
- C. ASTM D 698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)); 2007.
- D. ASTM D 1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method; 2007.
- E. ASTM D 1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN m/m³)); 2009.
- F. ASTM D 2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method; 2008.
- G. ASTM D 2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System); 2006.
- H. ASTM D 2922 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth); 2005.
- I. ASTM D 3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth); 2005.

- J. ASTM D 4318 - Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils; 2005.
- 1.04 DEFINITIONS
- A. Finish Grade Elevations: Indicated on drawings.
 - B. Subgrade Elevations: Indicated on drawings.
- 1.05 SUBMITTALS
- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
 - B. Certified copies of all results of moisture-density tests and field compaction density tests.
 - C. Gradations of Stone Bedding, Stone Fill, Sand Bedding, Bank Run Gravel, Screened Gravel, and Crushed Gravel/Granular Fill.
 - D. Gradations of other material proposed for use in the work.
 - E. Copies of measurements and computed volumes of unstable material removed.
 - F. Certification from testing laboratory that crushed gravel under-drain material meets permeability requirements at required compaction.
- 1.06 QUALITY ASSURANCE
- A. Unless otherwise specified, or approved by Engineer in writing, tunneling is not permitted.
 - B. If trenching widths are exceeded, redesign with stronger pipe, concrete cradles or other special installation procedures may be required and shall be provided where directed by the Engineer. All additional costs, including the cost of redesigns, shall be borne by Contractor.
 - C. Do not restrict access to any private road or driveway for more than one hour. Provide and maintain suitable temporary crossing over open ditches where required to meet this condition.
- 1.07 DELIVERY, STORAGE, AND HANDLING
- A. When necessary, store materials on site in advance of need.
 - B. Verify that survey bench marks and intended elevations for the Work are as indicated.
 - C. Protect plants, lawns, and other features to remain.
 - D. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, curbs, and utilities from excavating equipment and vehicular traffic.
 - E. Maintain trenches free of groundwater, sewage, stormwater, ice and snow during the progress of the Work and until the finished Work is safe from injury.
 - F. Protect subgrades against freezing by means of insulated blankets, salt hay or other

methods.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Concrete for Cradles and Encasements - Class C concrete as specified in Division 3.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that survey bench marks and intended elevations for the work are as indicated.

3.02 TRENCHING

- A. Excavate to the widths and depths shown on the Drawings, specified or directed by Engineer. Trenches of narrower widths are permitted provided that the smaller widths do not adversely affect the proper installation of the Work.
- B. Where it is necessary for pipes to be laid in fill, place Select Fill in uniform horizontal layers not over 6" in compacted thickness. Compact each layer in accordance with Section 31 2250. Carry fill up to an elevation at least two feet above the elevation of the top of the pipe to be laid and then excavate the trench.
- C. Limit each day's trench excavation to the length of pipe that will be installed that day, and then to no more than 100' ahead of the pipe laying.

3.03 TRENCH BOTTOMS

- A. General - The bedding required for each type of pipe is specified and are detailed on the Drawings.
- B. Class A - Concrete and Concrete Encasement - Excavate trench to the required subgrade elevation to receive concrete. Rest pipe on concrete brick or sacks of lean concrete, keeping supports to a minimum but sufficient to support the pipe and to retain the pipe at the required line and grade. Install forms and reinforcing where required. Exercise extreme care in placing concrete so as not to move the pipe. Work concrete under and around the pipe. Other supports may be acceptable.
- C. Class B - First Class Bedding - Excavate trench to the required subgrade elevation. Place Sand bedding in layers not exceeding 6" in compacted thickness. Compact bedding and shape to the configuration of the pipe and then hand dig depressions just large enough to accommodate pipe joints. When using Stone Bedding, place stone to the elevation of the bottom of the pipe and firmly tamp. Add additional stone so as to form a shaped bed for the pipe barrel to rest on. After the pipe has been set, add the additional stone along the sides of the pipe, as shown on the Drawings, and firmly tamp into place.
- D. Class B - Rock - All pipes shall be bedded in this manner when rock is encountered in the trenches. Place bedding material as described in "Class B - First Class Bedding" above.
- E. Class C - Ordinary - Excavate the bottom of the trench by hand and form a shaped bed

which will firmly support the lower quadrant of the pipe. Hand excavate depressions just large enough to accommodate pipe joints. The pipe shall rest on undisturbed soil. If the trench is over excavated, provide a bedding as directed by Engineer.

- F. Sand Bedding or Encasement - Excavate trench to the required subgrade elevation. For pipes, install bedding as required for "Class B - First Class Bedding." For cables and remainder of sand encasements, place sand in layers not exceeding 6" in compacted thickness.

END OF SECTION

SECTION 31 2318

ROCK REMOVAL

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Removal and disposal of boulders and rock from the construction site, excavation and trenches.

1.02 RELATED SECTIONS

- A. Section 31 2315 - Excavation
- B. Section 31 2316 - Fill and Backfill: Fill materials.
- C. Section 31 2317 - Trenching for Site Utilities
- D. Section 32 2901 - Restoration of Surfaces

1.03 REFERENCES

- A. NFPA 495 - Explosive Materials Code; National Fire Protection Association; 2001.

1.04 DEFINITIONS

- A. Solid Rock - Naturally deposited rock material which cannot be removed by a modern, power driven, one cubic yard backhoe excavator in good condition without continuous drilling and blasting and includes boulders and reinforced concrete pavement exceeding one cubic yard in volume.
- B. Loose Rock - Shale, slate, soft sandstone, nested boulders and other rock material which is decomposed, stratified or shattered to such an extent that it can be removed by a modern, power driven, one cubic yard backhoe excavator in good condition without the need for drilling or blasting.
- C. Rock Excavation - Removal and disposition of solid rock, only, which is encountered within the specified payment limits of excavations.
- D. Trench Rock Excavation - Rock Excavation where Solid Rock is removed from trenches (for pipe-lines, cables, conduits, manholes and other related, confined work) where the bottom width of the installed item does not exceed 8 inches.
- E. Site Rock Excavation - All Rock Excavation other than Trench Rock Excavation

1.05 SUBMITTALS

- A. Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Copies of all permits required.
- C. Copies of additional hazard insurance policy covered required.
- D. Names of blasters, qualifications, experience records, certificates of insurance and copies of licenses.

- E. At least two weeks prior to commencing drilling and blasting operations, CONTRACTOR shall submit to ENGINEER for approval complete details of his proposed blasting operations, including the following for each separate blasting area (i.e., building, rock cut, trench, etc.).
1. Sequence and schedule of blasting rounds, including the general method of developing the excavation, lift heights, etc.
 2. Specifies of a typical production round (away from the perimeter of excavation) and specifies of all controlled blasting at the perimeter of the excavation, including:
 - a. Diameter, spacing, burden, depth, and orientation of each drill hole.
 - b. Type and nomenclature of detonators, and delay pattern.
 - c. Type, nomenclature, and weight per cartridge of explosive to be used, and weight distribution of charge to be used within each hole, as well as total weight of explosive charge on each delay, and the total weight for the blast round.
 - d. Type and distribution of stemming to be used in each hole.
 - e. Estimates of vibration levels at nearest adjacent structures.
 3. Methods of matting or covering of blast area, if required to prevent flyrock and excessive airblast pressure.
 4. Written evidence of the licensing, experience, and qualifications of blasters who will be directly responsible for the loading and firing of each shot.
 5. Name and qualifications of the person responsible for designing and directing the blasting.
 6. A listing of instrumentation which Contractor proposes to use to monitor vibrations and airblast overpressure levels, together with performance specifications and user's manual supplied by the manufacturers, and a recent calibration (within the previous six months) to a standard traceable to the National Bureau of Standards).
 7. A copy of the blasting permit obtained to conduct blasting on the Site.
 8. Before-blasting conditions survey report.
- F. Prior to construction, the Contractor shall at his own expense have prepared by an independent agency approved by the Engineer, a survey of all existing structures and utilities (including wells and railroads) on the site and within 500 feet of the site. Said survey shall address the structural integrity of all existing structures and utilities, and the flow capability of any wells. Upon the completion of blasting operations, the Contractor shall have prepared by the same independent agency a survey addressing the structural integrity of the same structures and utilities and the flow capability of any wells.

- G. In addition, a blast monitoring program shall be established with seismographs installed at selected monitoring stations inside adjacent structures. Selected monitoring stations shall be, as a minimum, the nearest structure for all blasts, and other sensitive structures as recommended by Contractor's independent agency, Owner or Engineer. During construction, detailed records should be kept of:
1. Charge weight;
 2. Location of blast point and distance from existing structures;
 3. Delays;
 4. Response indicated by air blast monitors and seismographs including peak particle velocity, vibration frequency, and air blast, for safety.
- H. Small charges should be used initially to establish Site specific relationship between charge weight, distance and response.
- I. In the event that Contractor's blasting round results in ground vibrations or airblast overpressure which exceed the blasting limit criteria specified herein, Contractor shall, prior to detonating any subsequent rounds, revise his round design appropriately to reduce the vibrations and submit the revised round design to Engineer for approval.
- J. Whenever explosives are used, they shall be of such character and in such amount as permitted by the State of Maine, local laws and ordinances, and all respective agencies having jurisdiction over them. Contractor shall survey the entire blast area for a minimum of five minutes following a blast to guard against rock falls before commencing work in a cut.
- K. Review by Engineer of the blast design and techniques shall not relieve Contractor of responsibility for the accuracy, adequacy, and safety of the blasting, exercising proper supervision and field judgment, and producing the results within the blasting limits required by these Specifications.
- L. The specific requirements of this section are not intended and should not interfere with the ability of Contractor to alter spacing of holes and explosive loading so that adequate rock breakage may be obtained.
- M. Within 24 hours following each blast, Contractor shall submit to Engineer a Blasting Monitoring Report, which shall include the following items:
1. Details of the round as shot, including drill hole diameter, spacing, burden, depths, delay pattern used, with charge weights for each delay, and loading configuration of typical holes.
 2. Blasting Monitoring Data:
 - a. A plan drawing, to scale, showing the location of each blast monitoring instrument, as well as the location of each round.
 - b. Results of blast monitoring at each instruments location, including peak particle velocity in inches per second (in/sec), vibration frequency in

Hertz (Hz) and peak airblast overpressure in pounds per square inch (psi), as well as a copy of the strip chart recording for each monitoring location, marked with the date, time, and location of equipment.

1.06 QUALITY ASSURANCE

- A. All blasting operations shall utilize experienced blasters and comply with all applicable Federal, State and Local laws, ordinances, codes and regulations including OSHA (1926), OSHA and NFPA code 495. Blasting shall be done only by qualified, reputable persons regularly engaged in this type of work. Conform to all OSHA requirements, including, but not limited to, notification of overhead utility Owners, and posting of Danger signs and a code of blasting signals, and use of flagmen to control adjacent traffic.
- B. Investigate, evaluate and assess the quantity of rock to be removed and the difficulties and hazards associated with its removal.
- C. Charges shall be of such power, spacing and timing that the blasts will not make excavations unduly large, shatter adjoining rock, nor damage or endanger life, property, work completed or in progress, adjacent utilities and other structures. Cover each blast with heavy timbers or steel mats. The Contractor shall be fully liable for all damage or nuisance caused by the blasting operations and shall promptly repair all damages and settle all claims at his expense.
- D. Owner and Engineer reserve the right to require removal of rock by line drilling and wedging if blasting operations are performed in violation of Specification requirements.
- E. Method of measurement to be agreed upon prior to blasting.
- F. Explosives Firm: Company specializing in explosives for disintegration of rock, with five years documented experience.

1.07 REGULATORY REQUIREMENTS

- A. Conform to applicable code for explosive disintegration of rock and to NFPA 495 for handling explosive materials.
- B. Obtain permits from authorities having jurisdiction before explosives are brought to site or drilling is started.

1.08 PROJECT CONDITIONS

- A. Contractor shall, at his own expense, have prepared by an independent agency approved by the Engineer, a survey and documentation of the conditions of buildings and utilities within 500 feet of rock removal, prior to blasting, and photograph existing conditions identifying existing irregularities.
- B. The survey shall address the structural integrity of all existing structures and buildings.
- C. At the completion of blasting operations, the Contractor shall have prepared by the same independent agency a second survey addressing the structural integrity of the same structures and utilities.
- D. Coordinate work within residential areas with owners of buildings and/or utilities.

1.09 DELIVERY, STORAGE AND HANDLING

- A. Handle and store explosives in strict accordance with applicable Federal, State and Local laws, ordinances, codes and regulations, and with NFPA 495, except that where more stringent requirements are contained elsewhere herein, such requirements shall govern.
- B. Keep explosives on site only in such quantity as may be needed for the work under way and only during such time as they are to be used.
- C. Store explosives in a secure manner separate from all tools, with caps or detonators safely stored at a separate point more than 100 feet distant.
- D. Remove remaining explosives from the job site when their need is no longer required.
- E. Disposal of rock shall be by one of the following:
 - 1. If rock is suitable in nature and of the proper size, it may be used as rip-rap where rip-rap is required in the Work.
 - 2. If the Contract Documents permit or require the use of rock in embankments, fills or other areas, it may be incorporated into the Work accordingly.
 - 3. If the Contract Documents designate a spoil or stockpile area, deliver and neatly place the rock in the designated area.
 - 4. Delivered to an area designated by Owner or Engineer.
 - 5. If none of the above apply, remove the rock from the Project site and dispose of off-site at an approved location.

1.10 SCHEDULING

- A. Notify Engineer and homeowners in the immediate vicinity at least 48 hours prior to blasting operations.

1.11 INDEMNITY

- A. Notwithstanding full compliance with these specifications, approval of blasting plan, and successful limitation to maximum peak particle velocity and airblast overpressure as specified herein, Contractor shall be solely responsible for any damage, direct or indirect, arising from blasting and shall hold Engineer harmless from any costs, liens, charges, claims, or suits, including the cost of defense arising from such damage, reasonably determined to be caused by Contractor's activities. Engineer shall be additionally named insureds on any insurance policy covering blasting carried by Contractor, and this requirement shall also be enforced on any subcontractor retained by Contractor.

1.12 PROTECTION OF COMPLETED WORK

- A. Contractor shall conduct the blasting operations in such a manner that completed work of any type is not damaged. Any replacement or repair of damaged work as directed by Engineer shall be made at no additional cost to Owner and Engineer. No blasting shall be done within 200 feet of concrete, shotcrete, or grout which has been in place

less than seven (7) days, not within 50 feet of any concrete, shotcrete, or grout that is older than seven (7) day, unless authorized by Engineer.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Explosives: Type recommended by explosive firm following seismic survey and required by authorities having jurisdiction.
- B. Delay Device: Type recommended by explosives firm.
- C. Blast Mat Materials: Type recommended by explosives firm.
- D. Concrete: Concrete used to fill excavations that have been over-excavated shall be Class C (28-day compressive strength of 2,000 psi) as specified in Division 3.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that all limiting boundaries of temporary and permanent easements and property lines are clearly marked in the field and that blasting operations will not violate these boundaries.
- B. Ascertain and verify the locations and character of structures, underground lines and subsurface conditions and verify that blasting operations will not adversely affect them.
- C. Do not begin operations until conditions are satisfactory.

3.02 PREPARATION

- A. If over burden is to be removed prior to blasting, clean surfaces of rock to be removed and take cross sections in the presence of Engineer.

3.03 PERFORMANCE

- A. Remove rock to the limits shown on the Drawings, specified or directed by Engineer.
- B. Cut subgrades in rock, where concrete is to be placed, to a firm level surface and clear off all loose material. Make rock surfaces sufficiently rough to ensure adequate bonding of concrete.
- C. Rock excavated below indicated foundation subgrades, not authorized by Engineer, shall be replaced to the indicated subgrade by backfilling with Class C concrete, or other materials which may be approved by Engineer.
- D. Excavations which are made wider than shown on the Drawings, specified or authorized by Engineer, may necessitate redesigns and stronger materials for which all costs shall be borne by Contractor.
- E. Vibration Limits - Contractor shall conduct all blasting operations in such a manner that peak airblast overpressure and peak particle velocity of ground vibrations do not exceed the following limits at the location of any existing dwelling or other building in the vicinity of the project.

Distance(D) from Blast Round to Building (ft)	Maximum Allowable Peak Particle Velocity (PPV) of Ground Vibration (in/sec) (1)	Maximum Allowable Airblast Overpressure (psi)
Less than 300	1.00	0.014
Greater than 300 or at Site Limits	0.75	0.014

3.04 NOTES

- A. Maximum PPV shall be the maximum of three components measured in three mutually perpendicular directions (transverse, vertical and longitudinal)
- B. Contractor shall monitor vibrations at the nearest for all blasts and other sensitive structures as designated by Section 1.03.structure

3.05 FIELD QUALITY CONTROL

- A. Independent agency field inspection will be provided under provisions of Section 01 4000 - Quality Requirements as noted above

END OF SECTION

SECTION 32 2741

PAVEMENT REPLACEMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Replacement of pavement and subbase materials removed or damages during installation of utility trenches.

1.02 RELATED REQUIREMENTS

- A. Division 32 – Exterior Improvements

1.03 REFERENCE STANDARDS

- A. MDOT – Maine Department of Transportation "Standard Specifications", 2020 Edition, including all addenda.
- B. Highway Department – Maine Department of Transportation, Augusta, Maine

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Name, address and telephone number of asphalt plant proposed for use and certification that the plant conforms to the requirements of these specifications.
- C. Names and descriptions of pavers, rollers and other equipment proposed for use.

1.05 PERFORMANCE REQUIREMENTS

- A. Paving replacement under this work item is limited to replacement of pavement over utility trenches. Pavement on all secondary roads will be installed to match existing thickness and as specified herein.

1.06 QUALITY ASSURANCE

- A. Provide at least one person who shall be present at all times during the excavation of this portion of the Work and who shall be thoroughly trained and experienced in the placing of the type of pavement specified and who shall direct all work performed under this Section.
- B. Use only personnel thoroughly trained and experienced in the skills required for installing and finishing, and in operating the required equipment.
- C. Perform Work in accordance with State of Maine Highways standard.

- D. All testing shall be performed by the approved testing laboratory. Engineer may use the testing laboratory for inspection services.

1.07 SCHEDULING

- A. Coordinate work with the work of other Sections to avoid delays and damage.
- B. Notify Engineer at least 24 hours in advance of the placing of any materials under this Section.
- C. Schedule work and operations to allow ample time for testing and inspection. Cooperate with Engineer and the testing laboratory and provide access to all phases of the Work.
- D. Place temporary pavement as specified or directed within 2 days after backfilling and compaction has been completed.
- E. Do not construct permanent pavement until after trenches have set a minimum of thirty (30) days. If it is not possible to schedule operations so this may be accomplished prior to the completion date, as stated in the Contract, an extension of time will be granted to complete this Work.

1.08 PROJECT CONDITIONS

- A. Remove any pavement, pavement foundation, or appurtenances damaged by construction operations to the extent ordered by the Engineer so that the whole roadway will have a true and uniform surface and will conform to the proper grade and cross sections.
- B. Neatly saw cut all pavements to be removed, creating as little damage as possible to the adjoining pavement.
- C. Comply with the requirements concerning weather limitations as specified in MDOT Standard Specifications.
- D. Install permanent pavements between April 15th and November 15th, and then only when environmental conditions are satisfactory.
- E. Restore all disturbed gutters and curbs to a condition at least equal to that in which they were found immediately prior to beginning of operations.

1.09 REPLACING STATE HIGHWAY PAVEMENTS

Nothing contained herein shall relieve the Contractor from carrying out all orders given by the State Highway Officials in connection with the replacement of pavement which is part of the State Highway System or State Aid Roads. Prior to doing any work which will affect a State Highway, a permit shall be obtained from the State of Maine Department of Transportation.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Temporary Pavement - Minimum 1-inch thickness of Bituminous Concrete, 12.5mm Superpave.
- B. Bituminous Concrete Surface Pavement - Conforming to materials and construction of Bituminous Concrete, 9.5mm Superpave.
- C. Bituminous Concrete Binder Pavement - Conforming to materials and construction of Bituminous Concrete, 19.0mm Superpave.
- D. Gravel Base - Conforming to requirements of MDOT 703.06 Type A Base Gravel
- E. Gravel Subbase - Conforming to requirements of MDOT 703.06 Type D Subbase Gravel

PART 3 EXECUTION

3.01 EXAMINATION

- A. Prior to the work of the Section, carefully inspect the installed work of all other trades and verify that all such work is complete, tested and approved by Engineer and to the point where this installation may be properly performed. Particulate attention shall be given to items such as pipelines so as to avoid excavating pavements at a later date.

3.02 PREPARATION FOR PAVEMENT REPLACEMENT

- A. Verify that utility trench has been backfilled and compacted to proper degree of compaction as specified in Section 31 2316.
- B. Gravel base and subbase course to have a thickness equal to the existing base course of a minimum of 18-inches thick, whichever is greater, after compaction to a minimum density of 95%.
- C. Place base course in maximum 6-inch lifts and compact per specification section 31 2250.
- D. Remove all loose or damaged material in the existing pavement and trim back existing surface course as directed by the Engineer.

3.03 INTALLATION OF TEMPORARY PAVEMENT

- A. Install temporary pavement in areas specifically designated by the Engineer in writing.

3.04 INSTALLATION OF BITUMINOUS CONCRETE PAVEMENT

- A. Remove and dispose of Temporary Pavement if utilized.
- B. New bituminous concrete pavement installed for this project shall be 2½-inches thick binder course, and 1½-inches thick surface course. Refer to details on the drawings.

3.05 MAINTENANCE OF PAVEMENT

- A. Temporary Pavements - Maintain in a satisfactory condition until permanent pavement is constructed by repairing any damaged or deteriorated sections promptly as directed by the Engineer.
- B. Permanent Pavements - Maintain in a satisfactory condition until the expiration of the guarantee period by filling all depressions and holes with similar materials and keeping the pavement in a safe and satisfactory condition for traffic.

END OF SECTION

SECTION 32 2901

RESTORATION OF SURFACES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Restoration of surfaces damaged or disturbed as a result of Contractor's operations.

1.02 RELATED SECTIONS

- A. Division 32 – Exterior Improvements

1.03 QUALITY ASSURANCE

- A. Provide at least one person who shall be present at all times during this portion of Work and who is thoroughly familiar with the types of materials being installed and the best methods for their installation and who shall direct all work performed under this Section.
- B. Grades and surfaces shall be restored so as to be equal to or better than the original conditions which existed at the time they were damaged or disturbed, except as otherwise specified or shown on the Drawings.
- C. Restoration of surfaces under the jurisdiction of Village, Town, County, State or other public authorities or public utilities shall be in accordance with the requirements of such authorities. Ascertain these requirements, procure necessary permits, arrange for required inspections, and pay all fees, deposits and other charges which may be required by the authorities.
- D. Existing pavements and walks to be restored shall be replaced with new pavement equivalent to or superior to the existing in quality, thickness, bearing capacity and surface finish, except where otherwise specified.
- E. Slate and flagstone sidewalk sections shall not move or rock when pressure is applied on any portion.
- F. Replacement curbs shall have the same dimensions and cross-section as the existing adjoining curbs and the same texture, finish, and appearance.
- G. Replaced pavements shall be free from all noticeable sags, settlements, bumps, humps, cracks or other defects. Other than possibly color, the replaced pavement shall be unnoticeable from the existing pavement.

1.04 SCHEDULING

- A. It is the intent of this Section to restore all surfaces as soon as possible so as to cause the least amount of inconvenience to all people and animals, to provide an aesthetically pleasing construction site, to protect lives, to ensure safety, to avoid property damage and to provide for orderly and safe traffic conditions.
- B. Rough grade all areas to be seeded or planted within 48 hours after installation of the

work; finish grade within one week after installation of the work, topsoil within three weeks after installation of the work and seed as soon as conditions are satisfactory. Replant trees, shrubs and other vegetation as soon as possible.

- C. Replace traffic and business signs as soon as possible, but no later than 24 hours after installation of the work.
- D. Replace guide rails as soon as possible, but no later than 72 hours after installation of the work.
- E. Replace all items as soon as possible, with special attention directed at those which control traffic, protect property and lives, are essential to a persons livelihood, create hazards when not in place, or are otherwise deemed essential.
- F. The phrase "after installation of the work" means after the installation of the work which necessitated the removal of an item or items.

PART 2 PRODUCTS

2.01 REUSE OF EXISTING MATERIALS

- A. Curbs, walks, fences, walls, signs and other items which have been removed, knocked down, or displaced shall be replaced with existing materials when, in the opinion of Engineer, such materials are in acceptable condition. Where such materials have been damaged, marred, broken, or are otherwise in an unacceptable condition, provide replacements of equal or better quality, appearance, size and type.

PART 3 EXECUTION

3.01 SCHEDULING

- A. Carefully inspect the work installed under other Sections and verify that all such work is complete to the point where restoration of surfaces may properly commence and to insure against the unnecessary disturbance of restored surfaces at a later date.
- B. Verify schedule of work for conformance to allowable planting times.
- C. Do not begin restoration work until conditions are satisfactory.

3.02 GRASS AND LAWNS

- A. Comply with Section 32 2921 - TOPSOIL AND SEEDING.

3.03 PLANTING AND REPLANTING

- A. Comply with Section 32 2930 - EXTERIOR PLANTS.

3.04 BITUMINOUS CONCRETE PAVEMENT

- A. Comply with Section 32 2740 - PAVEMENT REPLACEMENT

3.05 SIDEWALKS

- A. Concrete - Extend replacement sections to the nearest contraction or expansion joints. Thoroughly compact subgrade and provide a 12" minimum base course of granular

material under sidewalk. Compact base course and place concrete in accordance with Division 3 - CONCRETE. The minimum slab thickness shall be 5".

- B. Slate and Flagstone - Replace walks after backfill has been brought up to proper subgrade elevation and compacted. Place stones on a 2" bed of sand and adjust them to the proper line and grade, and to provide uniform bearing. Fill area between stones with mortar.
- C. Asphalt - Cut back undisturbed pavement as required in Section 32 2741. Thoroughly compact subgrade, install asphalt concrete and roll finished surfaces to match existing adjacent surfaces, as nearly as practicable.

3.06 CURBS

- A. Extend curb replacement sections to the nearest joint. Replace all damaged joint fillers.
- B. Granite and Stone - Reinstall curbs to line and grade.
- C. Concrete and Asphalt - Replace curbs in an approved manner so that the finished product is of the same size, shape and appearance as the existing curbs.

3.07 GUIDERAILS

- A. If, in the opinion of the Engineer, guide rails are carefully removed and protected and are in acceptable condition, they may be reused and reset in accordance with the requirements of Highway Department.
- B. If, in the opinion of the Highway Department, guide rails are not carefully removed and protected and are damaged or destroyed by Contractor, replace the guide railing in accordance with the requirements of the Highway Department.
- C. Prior to performing work in the vicinity of guide railing, carefully examine all guide railing components and immediately report to Engineer and Highway Department any existing damage or deterioration. If the Highway Department determines that any component is not adequate for reuse, they will dispose of such component, after it has been removed by Contractor, and will furnish replacement parts to be used by Contractor when he replaces the railing, or, Engineer will direct Contractor to furnish all required replacement parts and a Change Order will be issued to cover the additional costs.

END OF SECTION

SECTION 32 2921

TOPSOIL AND SEEDING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Preparation of subsoil for unpaved areas.
- B. Placing topsoil.
- C. Seeding, mulching and fertilizer, fertilizer and liming unpaved areas within approved limits as directed by the Engineer or as shown on Drawings.

1.02 RELATED REQUIREMENTS

- A. Section 31 2310 - Site Grading: Preparation of subsoil and placement of topsoil in preparation for the work of this section.
- B. Section 31 2316 - Fill and Backfill: Topsoil material.

1.03 SUBMITTALS

- A. Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Proposed seed mixtures and manufacturer's recommended rate of application.
- C. Seed labels containing vendor's name, seed name, lot number, percentage of germination, percentage of purity, percentage of weed seed and percentage of inerts.
- D. Fertilize and lime labels containing manufacturer's name, brand name, type, weight and guaranteed analysis

1.04 QUALITY ASSURANCE

- A. Provide at least one person who shall be present at all times during the topsoiling and seeding operations and who shall be thoroughly familiar with the types of materials being installed and the best methods for their installation and who shall direct all work performed under this Section.
- B. Establish a good stand of grass of uniform color and density.
- C. Sod may be used in lieu of seed, and shall be provided where specified, where shown on the Drawings, in areas where the establishment of grass may be difficult due to steep slopes or drainage flows, and where required to prevent erosion.
- D. Protect, maintain and care for all grassed areas.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver grass seed mixture in sealed containers. Seed in damaged packaging is not acceptable. Deliver seed mixture in containers showing percentage of seed mix, year of production, net weight, date of packaging, and location of packaging.

- B. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.
- C. Maintain seeded areas immediately after placement until grass is well established and exhibits a vigorous growing condition.

1.06 ENVIRONMENTAL REQUIREMENTS

- A. Seeding shall be done when the ground becomes workable in the Spring to June 1st, and between August 15th and October 1st. Ground and weather conditions must be satisfactory to seed and fertilize.
- B. Sodding shall be done between May 1st and October 15th.

1.07 GUARANTEE

- A. All work shall be guaranteed for a minimum of one year from the date of first acceptance of the Work or from the date when Engineer determines that Contractor has established a good, vigorous and healthy stand of grass of uniform color and density, whichever date is later.
- B. Final acceptance will be given by Owner after established grassed and sodded areas have been in place for one year in a vigorous and healthy condition.

PART 2 PRODUCTS

2.01 SEED MIXTURE

- A. Grade A quality, fresh and re-cleaned and proven to produce satisfactory growth in the locality of the Project.
- B. In existing grass areas, mixtures shall be comparable to existing grasses and, when established, shall match as nearly as practical, the existing undisturbed grass.
- C. Use seed mixture identified on the Drawings

2.02 TOPSOIL

- A. Type as specified in Section 31 2316. Obtained from excavation and grading work or, if insufficient material is available, it shall be imported.

2.03 LIME

- A. Calcic or dolomitic ground limestone.
- B. Total carbonates - 85% minimum content.
- C. Magnesium oxide - 10% minimum content for dolomitic and high magnesium limes.

2.04 FERTILIZER

- A. Standard Commercial Grade dry, free-flowing type suitable for common spreader application - or - finely-ground, water soluble type suitable for power spray application - or - granular or pellet type suitable for application by blower equipment.

- B. Minimum content:
 - 10% total nitrogen
 - 6% available phosphoric acid
 - 10% water-soluble potash

2.05 SOD

- A. Firm, dense, even textured and showing good root development. Grasses shall be of the type required for the intended use, suitable for the climatic conditions at the Project site, and as approved by the Engineer.
- B. Sod shall have a compact growth and shall be reasonably free from weeds, plants, large stones and other objectionable or detrimental materials.
- C. All sod shall be living, healthy and showing signs of vigorous growth.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that all underground and above ground work has been completed to the point where topsoiling and/or seeding operations may properly commence without unnecessary disturbances at a later date.
- B. Do not commence work under this Section until conditions are satisfactory.
- C. Loosen all ground surfaces to a minimum depth of 2 inches to facilitate bonding of the topsoil to the subgrade. Use discs, spike-tooth harrows, or other approved means.
- D. Clean surface of subgrade of all stones, sticks and rubbish larger than 2 inches in size and all litter and detrimental materials.
- E. After spreading, break up large, stiff clods and hard lumps, and rake off all stones and rocks larger than 1 inch in size, roots, litter, foreign matter, poisonous materials, and other materials which may be detrimental to the work. Dispose of all such materials off-site.
- F. Remove all topsoil spilled on highways, shoulders, sidewalks, driveways and other surfaces for which topsoil is not specified or required.

3.02 FERTILIZING

- A. Uniformly spread fertilizer at a rate identified on the plans with a cyclone or broadcasting type spreader.

3.03 LIMING

- A. Apply separately at the rate identified on the plans prior to fertilizing, seeding, and sodding. Lime may be applied dry spreader or as an aqueous solution by spraying.
- B. After application, work lime into top 3 inches of topsoil and redress surface to smooth finish.

3.04 SEEDING

- A. Sow seed uniformly with a cyclone or broadcasting type spreader at a rate recommended by the seed vendor and as approved by Engineer. The rate shall be based upon "new lawn" requirements and shall not be less than 5 pounds per 1,000 square feet.
- B. Sow seed when soils are moderately dry and when wind does not exceed five miles per hour.
- C. Following germination, immediately re-seed areas without germinated seeds that are larger than 4 by 4 inches.

3.05 ROLLING

- A. Where rolling is required, compact soil lightly with a lawn roller, immediately after seed is sown.

3.06 MULCHING - GENERAL

- A. In grass areas, use a mulch, matting, or a blanket to protect the seeded areas. Apply within 24 hours after the seeding operation is completed.
- B. In open and wooded areas, mulching is optional, except where it is required for erosion control.

3.07 MAINTENANCE

- A. Properly maintain all turfed areas by watering, cultivation, wedding, mowing, reseeding, filling eroded areas and other repairs and replacements until final acceptance of the Work.
- B. Reseed all areas where seed has failed to germinate and where seeded areas have been damaged by erosion, people, vehicular traffic or other causes.
- C. After sod has started to grow, resod any areas or portions failing to show life. Resod as often as necessary in order to establish a healthy, growing sod.

END OF SECTION

SECTION 33 2515

DISINFECTION OF WATER DISTRIBUTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Disinfection of site domestic water lines, site fire water lines, and relocated municipal water mains specified in Section 33 2510.
- B. Testing and reporting results.

1.02 RELATED REQUIREMENTS

- A. Section 33 2510 - Water Distribution.

1.03 REFERENCE STANDARDS

- A. AWWA B300 - Hypochlorites; American Water Works Association; 2010 (ANSI/AWWA B300).
- B. AWWA B301 - Liquid Chlorine; American Water Works Association; 2004 (ANSI/AWWA B301).
- C. AWWA C651 - Disinfecting Water Mains; American Water Works Association; 2005 (ANSI/AWWA C651).

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Test Reports: Indicate results comparative to specified requirements.
- C. Disinfection report:
 - 1. Type and form of disinfectant used.
 - 2. Date and time of disinfectant injection start and time of completion.
 - 3. Test locations.
 - 4. Initial and 24 hour disinfectant residuals (quantity in treated water) in ppm for each outlet tested.
 - 5. Date and time of flushing start and completion.
 - 6. Disinfectant residual after flushing in ppm for each outlet tested.
- D. Bacteriological report:
 - 1. Date issued, project name, and testing laboratory name, address, and telephone number.
 - 2. Time and date of water sample collection.
 - 3. Name of person collecting samples.
 - 4. Test locations.
 - 5. Initial and 24 hour disinfectant residuals in ppm for each outlet tested.
 - 6. Coliform bacteria test results for each outlet tested.
 - 7. Certification that water conforms, or fails to conform, to bacterial standards of the Maine Drinking Water Program.

1.05 QUALITY ASSURANCE

- A. Perform Work in accordance with AWWA C651. Note: the TABLET METHOD is NOT ACCEPTABLE.
- B. Testing Firm: Company specializing in testing potable water systems, certified by governing authorities of the State of Maine.

1.06 REGULATORY REQUIREMENTS

- A. Conform to applicable code or regulation for performing the work of this Section.
- B. Provide certificate of compliance indicating approval of water system after all modification, flushing and cleaning, and disinfection are complete.

PART 2 PRODUCTS

2.01 DISINFECTION CHEMICALS

- A. Chemicals: AWWA B300, Hypochlorite and AWWA B301, Liquid Chlorine.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that piping system has been cleaned, inspected.
- B. Schedule disinfecting activity to coordinate with start-up, testing, adjusting and balancing, demonstration procedures, including related systems.

3.02 DISINFECTION

- A. Provide and attach equipment required to perform the work.
- B. Inject treatment disinfectant into piping system.
- C. Flush, circulate and clean until required cleanliness is achieved; use municipal domestic water.
- D. Replace permanent system devices removed for disinfection.

3.03 FIELD QUALITY CONTROL

- A. Perform field inspection and testing in accordance with Section 01 4000.
- B. Test samples in accordance with AWWA C651.

END OF SECTION

SECTION 33 2605
PIPE AND FITTINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Material and bedding requirements for all pipe and pipe fittings for underground pressure and nonpressure piping.

1.02 RELATED SECTIONS

- A. Section 01 6660 - Pipe and Manhole Leakage Testing
- B. Section 31 2315 - Excavation
- C. Section 31 2316 - Fill and Backfill
- D. Section 31 2317 - Trenching for Site Utilities
- E. Section 32 2901 - Restoration of Surfaces
- F. Division 3 - Concrete

1.03 ABBREVIATIONS

(Also, see PIPE SCHEDULE 33 2605-1)

CUP	Copper Pipe
DIP	Ductile Iron Pipe
PE	Polyethylene
PVC	Polyvinyl Chloride

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements
- B. Brochures containing complete information and instructions pertaining to the storage, handling, installation, and inspection of pipe, fittings and joints furnished.
- C. Test certificates for the manufacturers' tests required under Paragraph 1.06.
- D. Pipe manufacturers' Certificates of Compliance on pipe, with each lot of pipe supplied. Immediately turn certificates over to Engineer. Materials delivered to the site without accompanying certificates will be subject to rejection.

1.05 QUALITY ASSURANCE

- A. Pipe and pipe fittings shall be produced in a plant of recognized reputation that is regularly engaged in the production of pipe conforming to the specified standards. Pipe and pipe fittings of the same type shall be the product of a single manufacturer.
- B. All pipe shall be manufactured in a plant of a member of the following organizations:

Pipe	Organization
DIP	Ductile Iron Pipe Research Association
CMP	National Corrugated Steel Pipe Association
PVC & PE	Plastics Pipe Institute

- C. Furnish the services of a competent field representative of the manufacturer at the start-up of installation of each type of pipe to instruct Contractor and Engineer in installation and inspection procedures. The representative, Contractor and Engineer shall inspect the first shipment or shipments of pipe and check dimensional tolerances prior to the installation of the first section of each type of pipe. The representative shall make periodic scheduled visits to the Project as the Work progresses and be present during leakage testing, when requested by Engineer.

1.06 SOURCE QUALITY CONTROL

- A. Copper Pipe - Inspect and test CUP in accordance with ASTM B88.
 B. Polyethylene Pipe - Inspect and test PE Pipe in accordance with ASTM D1248.
 C. Polyvinyl Chloride Pipe - Test as follows:

<u>Test</u>	<u>In Accordance with</u>
Quick Burst	ASTM D1599
Sustained Pressure	ASTM D1598
Acetone Immersion	ASTM D2152

- D. Ductile Iron Pipe - Inspect and test DIP in accordance with AWWA C151.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Each length of pipe delivered to the site shall be clearly marked with the name of the manufacturer, class of pipe and pipe diameter. PVC sewer pipe shall be marked with the legend "Type PSMDR 35 PVC Sewer Pipe." Store in accordance with the manufacturer's approved instructions.
 B. Carefully handle all pipe and fittings when loading and unloading. Lift pipes and fittings by hoists or lower on skid-ways in a manner to avoid shock. Lower pipe into trench with derricks, rope or other suitable equipment.
 C. Do not dump or drop pipe and fittings. Those that are dumped or dropped are subject to rejection by Engineer.
 D. Store PVC pipe under canvas or other opaque material which will allow air circulation but will eliminate the direct rays from the sun.
 E. Comply with all other recommendations of the manufacturers.

PART 2 PRODUCTS

2.01 COPPER PIPE

- A. Tubing - ANSI H23.1.
 - 1. Underground installations - Soft annealed, Type K.
 - 2. Interior and above-ground installations - Hard drawn domestic Type L.
- B. Fittings
 - 1. Wrought copper solder type - ANSI B16.22.
 - 2. Cast bronze flared tube fittings - ANSI B16.26.
 - 3. Cast bronze solder type - ANSI B16.23.
- C. Joints
 - 1. Soldered - Solid string or wire solder composed of 95-5 tin and antimony. Use noncorrosive flux.
 - 2. Flared - Flare pipe ends using proper size flaring tool specially manufactured for the flaring of pipe ends.
- D. Pipe Bedding - Ordinary, Class C bedding as specified in Section 31 2317 and as detailed on the Drawings, except in rock, where otherwise specified or when directed by Engineer.

2.02 DUCTILE IRON PIPE

- A. Pipe - AWWA C151, laying lengths, except for closures and specials, shall be a minimum of 18'.
- B. Fittings - AWWA C110, grey cast iron or ductile iron rated at 250 psi, unless otherwise noted.
- C. Joints - See PIPE SCHEDULE 33 2605-1.
 - 1. Mechanical - AWWA C111.
 - 2. Push-on - AWWA C111.
 - 3. Flanged - Specially designed long hub screw flanges, face drilling to ANSI B.16.1, Class 125 template for use with AWWA C110 fittings. Flanges shall be shop assembled. Pipe barrels shall be threaded and flanges power-tightened on. Flange faces and pipe ends shall be prefaced after assembly, plain face, smooth finish. All pipe threads shall be covered by the flange. Gaskets shall be factory cut, 1/16" thick, flat ring, cloth inserted rubber conforming to ANSI B16.221, 125 pound cast iron joint. Bolts shall be carbon steel, ASTM A307, Grade A, square head machine bolts with heavy steel hexnut. Bolt size and length shall conform to ANSI B16.1 for 125 pound cast iron joints, plain face, smooth finish.

4. Mechanical, Restrained - AWWA C106, except, provide mechanical joint retainer gland with set screws in lieu of follower gland.
 5. Ball and Socket - ANSI A21.10, maximum 15 deflection.
- D. Class - See PIPE SCHEDULE 33 2605-1.
- E. Couplings
1. Sleeve type coupling – Dresser Model 3506 by Pipeline Products Company; Hymax-2000 by Total Piping Solutions, Inc.; or approved equal.
- F. Lining - See PIPE SCHEDULE 33 2605-1.
1. Bituminous per AWWA C151.
 2. Cement Mortar with bituminous seal coat per AWWA C104.
- G. Coatings - Bituminous per AWWA C151.
- H. Pipe Bedding - Ordinarily, Class C bedding as specified in Section 31 2317 and detailed on the Drawings, except in projection conditions, rock, or where otherwise specified or when directed by Engineer.
- 2.03 POLYETHYLENE PIPE (PE)
- A. Pipe and Fittings - ASTM D1248.
 - B. Joints - Thermal butt-fusion for siphon piping or watertight joint for stormwater piping, and in accordance with the pipe manufacturer's recommendations (See PIPE SCHEDULE 33 2605-1).
 - C. Pipe Bedding - First Class, Class B as specified in Section 31 2317 and detailed on the Drawings, except in projection conditions, rock, where otherwise specified or when directed by Engineer.
- 2.04 POLYVINYL CHLORIDE PIPE
- A. NSF Seal - Pipe shall bear National Sanitation Foundation Seal of approval.
 - B. Pipe and Fittings - See PIPE SCHEDULE 33 2605-1.
 1. ASTM D2241 and ASTM D1784, Type 1, Grade 1 PVC. Laying lengths, except for closures and specials, shall be a minimum of 20 feet, plus or minus one inch.
 2. ASTM D1785, Type 1, Schedule 80 pipe - ASTM D2464 threaded fittings - ASTM D2467 socket type fittings.
 3. ASTM F789, Type PS-46, ASTM D3212 elastomeric gaskets. Laying lengths not greater than 12.5 feet, plus or minus one inch.
 4. ASTM D3034, Type PSM, ASTM D3212 elastomeric gaskets. Laying lengths not greater than 12.5 feet, plus or minus one inch.
 5. AWWA C900, ASTM D3139 elastomeric gaskets. Laying lengths, except for

closures and specials, shall be a minimum of 20 feet, plus or minus one inch.

6. AWWA C950, with elastomeric gaskets. Laying lengths, except for closures and specials, shall be a minimum of 20 feet, plus or minus one inch.

C. Joints - See PIPE SCHEDULE 33 2605-1.

1. Rubber sealing ring allowing expansion and contraction at each joint and supplied by the pipe manufacturer. Bell joint integral with the pipe shall be wall thickened so that standard dimension ratios are maintained or Rexceeded.
2. Mechanical Joint Restraints - Grip Ring Pipe Restrainer for C900 PVC.
3. Flanged - Flanges shall be screwed, with smooth or O-ring grooved faces as required to match companion ion flange, complete with gasket and bolts.

D. Pipe Bedding - As detailed on the Drawings.

2.05 COUPLINGS/FLEXIBLE CONNECTIONS

- A. Sleeve Type Coupling – Dresser Model 3506 by Pipeline Products Company; Hymax-2000 by Total Piping Solutions, Inc.; or approved equal.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Pipe installations are specified in other Division 33 under which the pipes are furnished and installed.

3.02 FIELD QUALITY CONTROL

- A. In the presence of Engineer, inspect each length of pipe delivered to the job for flaws, cracks, dimensional tolerances and compliance with the applicable specifications.
- B. Provide Engineer with suitable templates, calipers, feeler gauges and other equipment for checking pipes and fittings. Only pipes and fittings accepted by Engineer, and so marked, shall be installed in the Work.

3.03 PIPE SCHEDULE 33 2605-1 - See Attached Schedule

3.04 PIPING ABBREVIATIONS - See Attached

END OF SECTION

PIPE SCHEDULE

Drawing Pipe Legend	Use	Size	Strength	Pipe/ Joint	Fittings/Joints
A	Well Pump #1 to Treatment Building	2"	200 PSI	BLUE AWWA C-901 CTS HDPE TUBING/ FUSION	FUSION
B	Well Pump #2 to Treatment Building	2"	200 PSI	BLUE AWWA C-901 CTS HDPE TUBING/ FUSION	FUSION
C	Well Pump #3 to Treatment Building	2"	200 PSI	BLUE AWWA C-901 CTS HDPE TUBING/ FUSION	FUSION
D	Well Pump #4 to Treatment Building	2"	200 PSI	BLUE AWWA C-901 CTS HDPE TUBING/ FUSION	FUSION
E	Treatment Building to Alumni Building	4"	DR11	BLUESTRIPE AWWA C-906 HDPE PIPE/ FUSION	FUSION
F	Pipe (E) to Old Academy	2"	200 PSI	BLUE AWWA C-901 CTS HDPE TUBING/ FUSION	FUSION
G	Pipe (E) to Talbot Dormitory	1¼"	200 PSI	BLUE AWWA C-901 CTS HDPE TUBING/ FUSION	FUSION
H	Pipe (E) to Headmaster's House / Clifford House Services	2"	200 PSI	BLUE AWWA C-901 CTS HDPE TUBING/ FUSION	FUSION
I	Water Treatment Building	Varies	SCH 80	PVC	

Pipe strengths shown are minimum. Stronger pipe may be used. Abbreviations used in this SCHEDULE are defined below.

* Design for maximum trench loading which will be applied after backfill is in place.

PIPE ABBREVIATIONS

Strength	Linings and Coatings
CL – Class	BIT – Bituminous
DR – Dimension Ratio	CM – Cement Mortar w/ Bituminous Seal Coat
Materials	Joint Types
CU – Copper	CB – Coupling Band
DI – Ductile Iron	CMP – Compression
PVC – Polyvinyl Chloride	PO – Push On
HDPE – High Density Polyethylene	SOL – Solvent Cement
SS – Stainless Steel	Fusion – Butt Fusion Welded
	MJ – Mechanical Joint

SECTION 33 2610

BLOW OFF ASSEMBLIES

PART 1 GENERAL

1.01 SCOPE

- A. This section describes the requirements for furnishing and installing Blowoff Valve Assemblies as an appurtenance to treated water mains.
- B. This section does not include Blowoff Valves that are an integral part of other major installations, such as pumping and pressure reducing stations and other in-plant Blowoff or purge valves.

1.02 DESCRIPTION OF WORK

- A. Work under this section shall include, but not be limited to, excavation (regardless of surface and subsurface conditions), installing the connection to the main, blowoff lateral and valve, blowoff discharge pipeline, backfilling, installing the blowoff valve box and riser box along with lid and extensions, forming and pouring of valve and riser box pad, installing and testing the locating wire, installing a valve operator extension shaft, restoration of the surface area around the Blowoff Valve Assembly, and installing a post and guide marker.

1.03 RELATED SECTIONS

- A. Division 31 – Earthwork
- B. Division 32 – Exterior Improvements

1.04 ABBREVIATIONS

See PIPE SCHEDULE 33 2605-1

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements
- B. Brochures containing complete information and instructions pertaining to the storage, handling, installation, and inspection of pipe, fittings and joints furnished.
- C. Test certificates for the manufacturers' tests required under Paragraph 1.06.
- D. Pipe manufacturers' Certificates of Compliance on pipe, with each lot of pipe supplied. Immediately turn certificates over to Engineer. Materials delivered to the site without accompanying certificates will be subject to rejection.

1.06 QUALITY ASSURANCE

- A. Pipe and pipe fittings shall be produced in a plant of recognized reputation that is regularly engaged in the production of pipe conforming to the specified standards.
- B. Pipe and pipe fittings of the same type shall be the product of a single manufacturer.
- C. Furnish the services of a competent field representative of the manufacturer at the start-up of installation of each type of pipe to instruct Contractor and Engineer in installation and inspection procedures. The representative, Contractor and Engineer shall inspect the first shipment or shipments of pipe and check dimensional tolerances prior to the installation of the first section of each type of pipe. The representative shall make periodic scheduled visits to the Project as the Work progresses and be present during leakage testing, when requested by Engineer.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Each length of pipe delivered to the site shall be clearly marked with the name of the manufacturer, class of pipe and pipe diameter.
- B. Carefully handle all pipe and fittings when loading and unloading. Lift pipes and fittings by hoists or lower on skid-ways in a manner to avoid shock. Lower pipe into trench with derricks, rope or other suitable equipment.
- C. Do not dump or drop pipe and fittings. Those that are dumped or dropped are subject to rejection by Engineer.

PART 2 PRODUCTS

2.01 GENERAL

- A. Materials furnished for Blowoff Valve Assemblies shall include, but not be limited to, those shown in the "Blowoff with Valve Detail" drawing and as specified herein. This includes ductile iron pipe and fittings (See section 33 2605 – Pipe and Fittings), a 180° return bend (Schedule 40 steel), bird guard, adjustable valve box, permanent operating rod, gate valve with ductile iron restrained joints (See section 33 2641 – Buried Valves and Stops), Class C concrete thrust blocks, drain rock, stone slope protection, and guide markers.

2.02 PIPE AND FITTINGS

- A. See section 33 2605
- B. 2.3 Buried Valves and Stops

- C. See section 33 2641

PART 3 EXECUTION

3.01 INSTALLATION

- A. Pipe installations are specified in other Division 33 sections under which the pipes are furnished and installed. (Ref: 33 2605 - Pipe and Fittings)
- B. Blowoff Valve Assemblies shall be installed as shown on the "Blowoff with Valve Detail" drawing and as designated in these specifications.
- C. The blowoff discharge pipe shall terminate with a 180° return bend positioned as shown in the detail. The discharge shall be directed towards an existing drainage path.
- D. A 5' x 5' area of stone riprap shall be placed around the discharge, graded towards the existing drainage path.
- E. The valve box shall be adjustable to accommodate the final grade.
- F. A permanent operating rod shall be provided for valve operation.
- G. Class C concrete thrust blocks shall be installed at all pipe bends and fittings.
- H. Blowoff discharge pipelines are constructed as either a riser pipe, or as a discharge pipe into a drainage structure or natural drainage course. Fittings shall be placed on the end of the discharge pipe to direct the flow of water to minimize damage to surrounding areas.

3.02 FIELD QUALITY CONTROL

- A. In the presence of the Inspector, inspect each length of pipe delivered to the job for flaws, cracks, dimensional tolerances, and compliance with the applicable specifications.
- B. The Contractor shall make all blowoff valves, piping and fittings, and valve boxes available for inspection prior to installation and backfilling.

SECTION 33 2641

BURIED VALVES AND STOPS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Work covered by this Section includes the furnishings and installation of underground corporation stops, curb stops, gate and other valves, valve and service boxes, where shown on the Drawings and specified herein.
- B. Provide all valves and auxiliary equipment required for complete and proper operation of all systems, whether or not they are specifically described.
- C. Definitions: Valve - For purposes of this Section, valve means curb stop, corporation stop, and any other valve specified in Part 2.

1.02 RELATED SECTIONS

- A. Division 32 – Exterior Improvements.

1.03 QUALITY ASSURANCE

- A. Similar types of valves shall each be the product of a single manufacturer and the same models shall be identical, with all parts interchangeable.
- B. Acceptable products are specified in Part 2. Equivalent products of other manufacturers will be acceptable.
- C. Valves shall be of ample strength to withstand and operate satisfactorily under the specified pressures.
- D. Unless otherwise specified, perform shop tests with a hydrostatic water pressure equal to twice the rated pressure. Any valve which leaks or shows sign of defects is not permitted.

1.04 SUBMITTALS

- A. See Section 01 3000.
- B. Annotate submissions with the valve designations assigned in this Section and on the Drawings.
- C. Catalog cuts, with cut-aways, and technical data.
- D. Manufacturer's Certification of Compliance.
- E. Certification of compliance with Buy American requirements.
- F. Manufacturer's installation instructions, including any limitations on installation.
- G. Operation, maintenance, and spare parts data.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. During delivery, storage and handling, keep valves tightly closed to prevent foreign matter from damaging seat faces.
- B. Store valves in dry, enclosed areas, off the ground. If there is a likelihood of freezing, move materials to a warm area, or remove potentially dangerous moisture.
- C. Verify compliance with Specifications at time of delivery.

1.06 GUARANTEE

- A. For a period of 10 years from date of Substantial Completion, manufacturer shall repair or replace any resilient wedge gate valve which has been found defective in materials of workmanship under normal conditions of use and maintenance. Guarantee need not cover alterations made by Owner, damage from accidents, abuse, and vandalism, nor Acts of God. Manufacturer's liability shall be limited to the initial cost of valves and installation.

PART 2 PRODUCTS

2.01 VALVES - GENERAL

- A. Products - The types, sizes, acceptable manufacturers, and catalog numbers of required valves are specified in this Part. Where valves are required for proper operation or control, or where required by pertinent codes, regulations or ordinances, or where shown on the Drawings, yet not included, they shall be furnished and installed and shall be of the proper type, size, and construction, and of a quality equivalent to that established by the valves which are specified.
- B. End Connections - Conform to the following:
 - 1. Bell & Spigot - ANSI A21.10
 - 2. Mechanical Joint - ANSI A21.11
 - 3. Flanged Cast Iron - ANSI B16.1
 - 4. Flanged Ductile Iron - ANSI B16.42
 - 5. Fire Hose Threads - ANSI B16.42
 - 6. Hose Threads - ANSI B2.4
- C. Pressure Rating - 150 psig (min.), non-shock W.O.G., unless otherwise noted.

2.02 CORPORATION STOPS

- A. Construction - Corporation stops shall conform to AWWA C800 and shall be of solid brass or bronze construction suitable for compression type connections. Corporation stops shall be Mueller Company Type H-15008, Red Hed Mfg. Co., Fig. 226, or approved equal.
- B. Tap Size Limitations - Do not drill taps larger than those permissible for the size, material, and thickness of pipe being tapped. Permissible size shall be those established by the appropriate pipe standard, or by the pipe manufacturer in the

absence of a standard. The appropriate standard for ductile iron pipe is AWWA C151. Where a required tap size exceeds a pipe's capabilities, use one of the following:

1. A tapped tee.
2. Ford Meter Box Co. Style 101N or 202N; Powerseal Model 3417DI; or approved equal.

2.03 CURB STOPS

- A. Curb stops shall be brass, ball valve, type with a PTFE coated brass ball and double o-ring seal. Inlet and outlet shall have compression type pack connections with gripper band (or grip joint) for copper pipe. The curb stops shall open left in accordance with Owner standards, shall not have a drain, and shall be manufactured by Mueller Company, A.Y. McDonald Mfg. Company, or approved equal.

2.04 GATE VALVES

- A. Construction - Non-rising stem, iron body, bronze mounted gate valves conforming to AWWA C509-87, standard for Resilient Seated Gate Valves. Valves shall be 150 pound unless the pipe to which the valve is attached has a higher class rating. Waterous Series 500 with cast ductile iron wedge encased in a bonded styrene butadiene elastomer covering which forms the sealing surface; Clow Valve Company AWWA C509; or approved equal. Coat valve body, inside and outside with epoxy coating.
- B. Operators:
 1. Provide 2-inch by 2-inch operating nuts.
 2. Unless those presently in service in the Community open clockwise, operating nuts shall be turned counterclockwise to open valves.
 3. Provide extension rods to bring the operating nut to within one foot of finish grade.
- C. Valve Boxes - Provide each buried valve with a valve box unless otherwise specified or required.
- D. Indicators -
 1. General - Buried valves with post indicators are specified or shown on the Drawings, they shall be post indicator type valves and shall conform to the general requirements as listed above.
 2. Valves - Post indicator valves shall be figure #27MP as manufactured by American Valve Co., the equivalent as manufactured by Stockham Valves & Fitting Co., or approved equal.
 3. Indicator Posts - Posts shall be as manufactured by Kennedy, Stockham, Clow, or approved equal. The indicator post shall be supplied with handwheel operator.
- E. Packing - Valves shall be capable of being repacked under pressure.

2.05 YARD HYDRANTS

A. Yard hydrants shall be comprised of 1" NPT inlet with drain below the frost line. Hydrants shall have 1" NPT inlet, 3/4" brass hose thread outlet, stainless steel operating rod through Teflon Packing, 1" galvanized pipe, heavy-duty cast iron head, heavy cast brass valve body with two flow ways, and molded rubber plunger constructed of self-lubricating material. Hydrant flow rate shall be 40 GPM at 60 psi. Hydrant shall be Merrill R-6000 Series Frost Proof Yard Hydrant or approved equal.

2.06 TAPPING VALVES

- A. Use - For tapping existing pressure mains which are in service.
- B. Ratings - Tapping valves and sleeves for valve sizes two through twelve inches shall be rated for 200 psi; and for sizes fourteen through twenty-four inches shall be rated 150 psi.
- C. Ductile Iron - Kennedy Valve Mfg. Co. "Squareseal" tapping sleeve. Kennedy Valve Mfg. Co. Fig. 950X cast iron, double disc gate valve (F-MJ) with operating nut, conforming to AWWA C500. Open counter-clockwise. Also, equivalent by Clow Corporation, Mueller Co., or other approved equal.
- D. Polyvinyl Chloride - Branch lines and service connections 1-inch or smaller shall be made using bronze tapping saddles made for use with PVC pipe and having stops to prevent over-tightening of the clamp saddles. Connections larger than 1-inch shall be made using the appropriate tee, wye and/or reducer.

2.07 VALVE BOXES

- A. Valve boxes are required on all buried valves.
- B. Box - Two-piece, cast iron, slide type with at least 4½" shafts, recessed cover, upper section and lower section, Clow F-2452 or F-2450 (greater than 10"), Tyler Series 6855 and 6865 (greater than 12"), or approved equal.
- C. Cover - Cast in the cover the words, "WATER", "SEWER" or "GAS", as applicable for water lines, lines carrying sanitary sewage or sludge and gas lines, respectively. In addition, where a valve designation is shown on the Drawings, (eg. SV-1), stamp the valve designation on the top surface of the cover.
- D. Seals - Seal valve box covers and each slide section to exclude surface water and the entrance of dirt. Use rubber "O" ring gaskets or a " " rope impregnated with a non-hardening tar compound equal to E-Z Rise Seal Pack.
- E. Spare Seals - Furnish spare seals in a quantity equal to 5% of the total number, or footage, used in the Work.
- F. Coatings - Two coats of asphaltic varnish, inside and outside, applied by manufacturer.

2.08 SERVICE/CURB STOP BOXES

- A. Box - Boxes including stationary rods and pins shall be the approved equal of those

furnished by Mueller Company, Decatur, Illinois, or Clow Valve Company or approved equal. Boxes shall be adjustable and shall be installed as indicated on the drawings and as directed by the Engineer.

- B. Coatings - Two coats of asphaltic varnish, inside and outside, applied by manufacturer.

2.09 T-HANDLE WRENCHES

- A. For underground valves, provide two T-handle socket wrenches of 5-foot length.
- B. Apply two coats of asphaltic varnish to all wrenches.

2.10 SHUTOFF KEYS

- A. General - Furnish shutoff keys for underground curb stops, meter valves, service valves and the like. The number of keys required equals 2% of the number of valves provided, but not less than 3 nor more than 10.
- B. Length - Length shall be such that the top of the key shall be from 3' - 4' above grade.
- C. Coatings - Two coats of asphaltic varnish.

2.11 MISCELLANEOUS FITTINGS

- A. Miscellaneous fittings include saddles, service clamps adapters, or other fittings required to provide an adequate service connection. Saddles or service clamps shall be used on all distribution piping requiring such fittings and shall have a minimum working pressure of 250 psi. A single or double strap shall be used as manufactured by Mueller, Red Hed Manufacturing Company or approved equal.
- B. All adapters and miscellaneous fittings shall provide an adequate seal at the working pressure of the water main and shall be for commercial use.

PART 3 EXECUTION

3.01 INSPECTION

- A. Verify that all valves may be installed at the locations indicated on the Drawings, or where required, and that proper operation of the valves will be possible after installation.
- B. In the event of interferences, immediately notify Engineer.
- C. Do not proceed with installation until conditions are satisfactory.

3.02 PREPARATION

- A. Clean all valves of foreign material, inside and out, with emphasis placed on bearing, machined and sliding surfaces.
- B. Operate valves several times over the full range from wide open to completely closed. Make adjustments, as required, to attain smooth, easy and proper operation.
- C. Adjust packings where required to insure a tight seal and proper operation. Replace defective packings.

- D. Replace defective and poorly operating valves.

3.03 VALVE INSTALLATION

- A. General - Install valves where shown on the Drawings, where required, or where directed by Engineer. Install in accordance with manufacturer's recommendations.
- B. Underground Installations - Install valves in pipelines with operating nuts pointed vertically upward. Install valve and service boxes plumb and straight, taking extra care in maintaining alignment during backfilling. Install seals in each box joint and cover to exclude surface water and infiltration of dirt, silt, and other debris. Boxes which are out of plumb by more than 1" in 6' in any direction, or are misaligned, or make it difficult or impossible to operate a valve, are not permitted.

3.04 TAPPING

- A. General - Where the size of the connection exceeds that allowed by Part II for the pipe in question, a boss shall be provided on the pipe barrel, the tap shall be made in the flat part of the intersection of the run and branch of a tee or cross, or the connection shall be made by means of a tapped tee, branch fitting and tapped plug or reducing flange, or tapping valve, all as indicated or approved.
- B. Ductile Iron - All drilling and tapping of ductile iron pipe shall be done normal to the longitudinal axis of the pipe; fittings shall be drilled and tapped similarly, as appropriate. Drilling and tapping shall be done only by skilled mechanics. Tools shall be adapted to the work and in good condition so as to produce good, clean-cut threads of the correct size, pitch, and taper.

3.05 CLEAN AND ADJUST

- A. After systems are pressurized, operate valves several times over the full range from wide open to completely closed. Make adjustments, as required, to attain smooth, easy, and proper operation.
- B. Adjust packings where required to stop leakage and to secure proper operation.
- C. Replace valves which are defective or do not operate properly, easily, and smoothly.
- D. Lubricate valves, operators, and appurtenances which require lubrication.

3.06 FIELD TESTING

- A. Upon completion of installation, all valves shall be tested in the presence of the Engineer and in accordance with the requirements of local or applicable plumbing or building code.
- B. All materials, equipment, tools, and labor for testing shall be furnished by the Contractor.
- C. Valves which carry water or liquid under pressure shall be filled with water and subjected to a pressure of 100 psig or 1½" the normal working pressure, whichever is greater, for a period of two hours or longer as may be necessary to examine the valve

for leaks.

- D. Should leaks be found, faulty joints shall be repaired, even to the extent of disassembling and remaking the joint. Caulking of threads or the use of chemical compounds to correct leaks will not be permitted. Defective valves shall be replaced by the Contractor and the tests shall be repeated until test requirements are met to the satisfaction of the Engineer.

END OF SECTION

SECTION 33 02646

FLUSHING HYDRANTS

PART 1 GENERAL

1.01 DESCRIPTION

- A. Work Included: Flushing hydrants shall be of the type, location, and orientation as indicated on the Drawings and are to be incorporated into the pipeline work for water mains.

1.02 QUALITY ASSURANCE

- A. Qualifications of Installers: The installation of flushing hydrants shall be under the direct supervision of a superintendent or foreman who has had reasonable experience in such installation.
- B. Codes and Standards: All flushing hydrants shall be manufactured in accordance with the appropriate specifications and installation requirements of the American Water Works Association (AWWA).

1.03 SUBMITTALS

- A. Shop Drawings: Prior to delivery on the site of any materials specified herein, the Contractor shall submit complete Shop Drawings to the Engineer in accordance with the provisions of Section 01300 of these Specifications. Included with this submittal shall be the following information, as a minimum:
 - 1. Statement indicating that the flushing hydrants meet or exceed the requirements of the AWWA Specification relating to the hydrants, as specified.
 - 2. Complete dimension data.
 - 3. Safe working pressure of the hydrant.
 - 4. Parts List.
 - 5. Specifications of the materials utilized in constructing the flushing hydrant.
- B. Operating Instructions: The Contractor shall submit four copies of the manufacturer's current recommended method for installation, repair, and maintenance of the flushing hydrants.

PART 2 PRODUCTS

2.01 FLUSHING HYDRANTS

- A. Flushing hydrants shall be Manguard No. 77 blow off hydrants with horizontal inlets as manufactured by the Kupferle Foundry Co. or approved equal.
- B. All hydrants shall meet or exceed the requirements of AWWA Standard Specification for Fire Hydrants for Ordinary Water Works Service (C502-latest edition).
- C. Screw type and size of the operating rod and nozzle caps shall conform to those in use in the community.
- D. Operating nut and nozzle cap nuts shall conform to the size in use in the community.
- E. Hydrant construction shall be such that the working parts can be removed for inspection or replacement without digging or without the need for a hoist or derrick.
- F. Hydrant connections to water main shall be through the use of a 2-inch corporation stop and saddle. Hydrant inlet shall be 2-inch female iron pipe size.
- G. Hydrants shall be of the "break flange" type which incorporates a ground line breakable flange so the hydrant will shear when subjected to a severe impact. The hydrant operating rod shall incorporate a safety coupling so that when traffic damage occurs to the hydrant, there shall be no loss of water through the hydrant valve.
- a. H. Hydrants shall be furnished with an automatic hydrant drain but shall have provision for permanently closing or plugging the drain in the event the hydrants are installed in an area of high groundwater. When drains are used, they shall automatically allow complete drainage of the hydrant barrel when the hydrant valve is fully closed. Drain ports shall automatically close when the operating rod is turned no more than two full turns in the direction of opening.
- H. Hydrant nozzle outlet shall be bronze 2 1/4 -inch NST. Operating valve shall be a 2-inch curb stop.
- I. Direction of opening of hydrants shall be counter-clockwise (left).

2.02 APPURTENANCES

- A. All connecting pipes, threaded couplings, corporations, curb stops, boxers, fittings, or other appurtenances for a complete hydrant installation shall be as specified elsewhere.

PART 3 EXECUTION

3.01 INSTALLATION

- A. All flushing hydrants shall be carefully erected and supported in their respective positions, shall be plumb and free from any distortion or strain and meet the following additional requirements:
- B. The Contractor shall provide suitable care and handling of flushing hydrants during installation to avoid damage or injury to the body or working parts.
- C. The Contractor shall clear or clean out all openings and seats at the time of installation, prior to activating with water.
- D. Flushing hydrants shall be installed with the minimum amount of cover required for water mains. The Contractor is responsible to determine the depth of bury for each individual hydrant and supply hydrant extensions so that the "bury line" of the hydrant will meet finish grade at its individual location, as needed.
- E. Hydrants which do not operate with reasonable ease or are found to leak or be otherwise defective shall be repaired or replaced at the Contractor's expense.
- F. Suitable thrust blocking and tie rods shall be installed as necessary to insure no movement of the hydrant when pressure is applied to the pipeline.
- G. The exact orientation of nozzles shall be as determined in the field by the Engineer.
- H. When, in the Engineer's opinion, the potential groundwater level in the location of the hydrant will be above the base of the hydrant, the Contractor shall plug the automatic drain valve. The method of plugging may be by installing a drain ring without drain holes, a special ring with a threaded drain outlet which must be plugged, or other approved means.
- I. For hydrants which have the drain outlet plugged due to high groundwater conditions, the contractor shall have the letters "nd" painted on the hydrant barrel. The letters shall be two inches high, shall be black and be located on the hydrant to face the street.
- J. Hydrants shall be field painted following installation with at least one coat of enamel in a color acceptable to the owner and the local fire department.
- K. Any hydrant which is installed but not placed in service shall be covered with a burlap bag to provide indication that it is not available for service.

3.02 TESTING

- A. Testing of all flushing hydrants shall be done as part of the pipeline testing requirements.

END OF SECTION

SECTION 33 2706

UNDERGROUND PRESSURE PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Furnishing and installation of underground pressure piping where shown on the Drawings and as listed in the Pipe Schedule in Section 33 2605.

1.02 RELATED SECTIONS

- A. Section 01 6660 - Pipe Leakage Testing
- B. Section 33 2605 – Pipe Schedule
- C. Section 31 2315 - Excavation
- D. Section 31 2316 - Fill and Backfill
- E. Section 31 2317 - Trenching for Site Utilities
- F. Section 32 2901 - Restoration of Surfaces
- G. Section 33 2515 – Disinfection of Water Distribution

1.03 SUBMITTALS

- A. See Section 01 3000.
- B. Shop drawings and catalog cuts for methods of anchoring pipe bends, if other than concrete reaction blocking is proposed.
- C. Shop drawings and catalog cuts of adapters for joining pipes of different materials and for caps and plugs at ends of pipelines.

1.04 QUALITY ASSURANCE

- A. Provide at least one person who shall be present at all times during the execution of this portion of the Work and who shall be thoroughly familiar with the types of materials being installed, pipe loadings and the material manufacturer's recommended methods of installation and who shall direct all work performed under this Section.
- B. Pipe installation shall be done by skilled workers and each pipe laying crew shall have a pipe laying foreman.
- C. Accurately install pipe to the lines, grades and depths designated on the Drawings. If no cover or grade is designated on the Drawings, the absolute minimum cover to finished grade shall be 4½' in unpaved areas and 5' in paved areas.
- D. Deflections at joints, if approved by Engineer, shall be no more than one-half the manufacturer's recommended deflection.

1.05 HANDLING

- A. Carefully handle pipes and fittings when loading and unloading. Lift by hoists or lower on skidways in a manner to avoid shock and damage to the pipe.
- B. Use derricks, ropes or other suitable equipment for lowering pipe into trenches where required due to weight of material and for the safety and protection of workmen, materials, equipment, property and the Work.

1.06 VERIFICATION OF EXISTING PIPING

- A. Due to the uncertainty of exact locations and depths of existing underground pressure pipes, it is a condition of this Contract that each proposed point of connection to an existing pipe be excavated to verify the data contained on the Drawings.
- B. Prior to the installation of any piping in the vicinity of a required connection, carefully excavate in the area of the connection, locate the existing pipe, determine the centerline elevation of the pipe, and make measurements to adjacent valves and other items which may be in conflict with the Work.
- C. If the information found differs from that shown on the Drawings, submit the data to the Engineer at least 10 days prior to the anticipated date for making the connection and do not proceed with the connection until Engineer issues a Modification.

1.07 JOB CONDITIONS

- A. Obtain permission from Washington Academy staff prior to shutting off a water service.
- B. In the event that a water main or water service must be shut off because of an accidental interruption, immediately notify Engineer and Washington Academy staff to make arrangements to restore service and to provide temporary service, if required.
- C. The Drawings indicate the required pipe sizes and locations of all piping and appurtenances. Verify all locations and immediately notify Engineer of any discrepancies or conflicts.
- D. Approval of Engineer is required prior to changing the location of any of the Work due to field conditions. Changes in pipe sizes are prohibited without a written consent from Engineer.
- E. All installed piping shall form completely connected systems including connections to valves, equipment, structures, existing facilities and appurtenances specified in other Sections to result in a satisfactorily operating installation.

1.08 PROTECTION OF WATERLINES

- A. Water and wastewater lines located in the same area shall be installed in accordance with the State of Maine Rules Relating to Drinking Water (10-144 Chapter 231).
- B. Parallel Water and Sewer Lines - Water mains shall be laid at least 10 feet horizontally from any existing or proposed sewer measured edge to edge. In cases where it is not practical to maintain a ten foot separation, the Maine Drinking Water Program may allow a waiver to this requirement on a case-by-case basis, if supported by data from

the design engineer. Such waivers may allow installation of the water main closer to a sewer, provided that the water main is laid in a separate trench or on an undisturbed earth shelf located on one side of the sewer at such an elevation that the bottom of the water main is at least 18 inches above the top of the sewer. Concrete encasement of the sewer joints may be required.

- C. Water and Sewer Line Crossings - Water mains crossing sewers shall be laid to provide a minimum vertical distance of 18 inches of free earth between the water main and the sewer. This requirement applies where the water main is either above or below the sewer. At crossings, one full length of water pipe shall be located so both joints will be as far from the sewer as possible. Special structural support for the water and sewer pipes may be required. In such crossings, the Maine Drinking Water Program may require sewer pipe of like material as the water pipe, plus concrete encasement.
- D. Special Conditions - Parallel Lines - When it is impossible to achieve the requirements of Paragraph 1.08.B., immediately notify Engineer. If Engineer concurs, he may order the reconstruction of the existing sewer with AWWA C900 PVC pressure pipe or ductile iron, mechanical joint pipe. The new line and the reconstructed line shall be pressure tested for leakage in accordance with Section 01 6660.
- E. Special Conditions - Crossing Lines - When it is impossible to achieve the requirements of Paragraph 1.08.C., immediately notify Engineer. If Engineer concurs, he will order 1) the water line raised, 2) the reconstruction of the sewer with AWWA C900 PVC pressure pipe or ductile iron, mechanical joint pipe or, 3) the sewer line to be concrete encased.
- F. Water Lines Crossing Below Sewer - When it is impossible to achieve the requirements of any of the preceding paragraphs, immediately notify the Engineer. If Engineer concurs, he will order 1) the reconstruction of the sewer with AWWA C900 PVC pressure pipe or ductile iron, mechanical joint pipe 2) the lowering of the water line to obtain a vertical separation of 18" between the bottom of the sewer and the top of the water line 3) the sewer line supported by the concrete cradle and 4) the water line be centered under the sewer to maximize the distance from the sewer to the nearest joint. The sewer and water lines shall be pressure tested for leakage in accordance with Section 01 6660.
- G. Additional work ordered under Paragraphs 1.08.D., E., and F. will be covered by a Change Order, unless superseded by notes on the Drawings.

PART 2 PRODUCTS

2.01 PIPE AND PIPE FITTINGS

- A. Materials are specified in Section 33 2605.

2.02 VALVES AND VALVE BOXES

- A. Types are listed in Section 33 2641.

2.03 CONCRETE FOR PIPE ENCASEMENTS AND CRADLES

- A. Class C concrete (2,000 psi) as specified in Division 3.

2.04 PIPE BEDDING

- A. Specified in Section 31 2317.

2.05 CONNECTIONS TO EXISTING PIPELINES

- A. Use fittings and adapters as shown on the Drawings. Where no details of the connections are shown, submit a proposal, for acceptance, showing all fittings, adapters and procedures to be used.

2.06 PIPE ADAPTERS

- A. Join pipes of different materials with adapters specially manufactured for that purpose and acceptable to Engineer.

2.07 UNDERGROUND WARNING TAPE

- A. Tape - Inert plastic film or bonded layer plastic with a metallized foil core. Brightly colored.
- B. Markings - Imprint identifying the type of line buried below.
- C. Manufacturers - Griffolyn Company, Inc., P.O. Box 33248, Houston, Texas; Lineguard Manufacturer, P.O. Box 426, Wheaton, Illinois, or approved equal.

2.08 TIE ROD PIPE JOINT RESTRAINT SYSTEM

- A. Tie rod system shall consist of galvanized, high-strength, low-alloy, heat treated steel - ASTM A242.

2.09 CONDUCTIVITY SYSTEM

- A. Electric conductivity shall be provided for ductile iron pipe and fitting by means of bronze wedges, retainer glands or conductivity strips. Pipe 4-inch and less, two (2) bronze wedges at opposite sides of the pipe. Larger pipe, install four (4) bronze wedges, in pairs.

PART 3 EXECUTION

3.01 INSPECTION

- A. Verify that points of connections to existing pipes have been excavated, elevations taken and given to Engineer, and Engineer has issued an authorization to proceed with the work as shown, or with modifications.
- B. Verify that trench conditions and pipe bedding are properly provided in accordance with Section 31 2316.
- C. All pipe and fittings shall be in full compliance with these Specifications.
- D. Reinspect each length of pipe, fittings and joints and remove from the Project site any damaged or defective materials.
- E. Do not install pipe until conditions are satisfactory.

3.02 PREPARATION

- A. Thoroughly clean interiors of pipes, fittings and appurtenances, joint surfaces, and gaskets prior to installation.

3.03 PIPE INSTALLATION - GENERAL

- A. Carefully lower pipes and fittings into the trench. Apply joint lubricant in accordance with the approved manufacturer's recommendations. Join pipe section and fittings.
- B. Select pipe and fittings so that there will be as small a deviation as possible at the joints and so that inverts present a smooth surface. Pipe and fittings which do not fit together to form a tight fitting joint are not permitted.
- C. Use only mechanical cutters for cutting pipe.
- D. Install pipes to the required lines and grades using an accepted method of control. Engineer reserves the right to disallow a method of control, including those previously accepted, if, in Engineer's opinion, the method of control is not providing the accuracy required under the Contract.
- E. Maintain cleanliness of installed pipe and fitting interiors throughout the Work. Plug ends when pipe installation is not in progress so that dirt, foreign matter, water, animals and people do not enter the pipe. Drainage of construction excavations through installed pipes is not permitted.
- F. Make connections between pipes of different materials with approved adapters. The encasement of adaptor made connections with concrete is not permitted.
- G. Install pipe with plain ends pointing in the direction of the flow.
- H. Dead ended lines shall be fitted with approved watertight plugs or caps specially manufactured for that purpose.
- I. Commence pipe laying at the lowest point, with the spigot ends pointing in the direction of flow.
- J. Install "underground warning tape", as shown on the drawings. Position marker directly above and parallel with the pipe with the printed side up.

3.04 ANCHORING PRESSURE PIPES

- A. Anchor all tees, dead ends, hydrants and bends deflecting 22½ or more. Anchor by means of any of the following:
 - 1. Concrete reaction blocking, as detailed on the Drawings.
 - 2. Mechanical joint retainer at fitting and all pipe joints within three pipe lengths on each side of fitting.
 - 3. Locked mechanical joints at fittings and all pipe joints within three pipe lengths on each side of fitting. In addition, the class of pipe shall be increased so that the required class of pipe specified is achieved under the groove.
 - 4. Metal harness and tie rods at fittings and all pipe joints within three pipe lengths on each side of fitting. Complete harness assembly shall be given two (2) brush coats of approved asphaltum paint after assembly and tightening.

3.05 CONNECTION TO EXISTING PIPELINES

- A. Connect to existing pipelines in accordance with the Drawings, or subsequently issued Modifications.
- B. Do work at such times and in a manner to cause a minimum of interruption to existing services.
- C. Provide necessary adapters and specials required to make the connections.

3.06 WATER SERVICE TAPS

- A. Provide water service taps to all buildings indicated on the Drawings unless noted otherwise. Service taps shall be as detailed on the Drawings and as herein specified for appropriate pipe materials.
- B. Ductile Iron Pipe - In accordance with AWWA C151.
- C. PVC Pipe - 1-inch and less, bronze tapping saddles, with stops, made especially for tapping PVC. Greater than 1-inch use tee or wye with reducer.

3.07 PIPE CONNECTIONS TO STRUCTURE

- A. All pipes connecting to manholes or other structures shall be connected as shown on the Drawings or as specified in other Sections.
- B. Where not specifically shown on the Drawings or specified, all pipes shall be installed so that a flexible pipe joint is located 12" from the outside face of the structure.

3.08 CONCRETE ENCASUREMENT AND CRADLES

- A. Encase pipe in concrete where shown on the Drawings.
- B. Encase pipe in concrete at utility crossings where required and in accordance with the detail shown on the Drawings.
- C. Provide concrete cradles where shown on the Drawings.
- D. Provide additional concrete encasements and cradles where directed by Engineer.
- E. The configurations, dimensions and limits of concrete are shown on the Drawings.

3.09 DISINFECTION

- A. Disinfect all water lines, services, valves, hydrants and appurtenances installed under this Section.
- B. Disinfect all existing water lines, services and appurtenances which were broken, damaged, contaminated or suspected of being contaminated.
- C. Disinfection shall comply with AWWA C651.

3.10 FIELD QUALITY CONTROL

- A. Afford Engineer access to the Work so that he may spot check the installations, or check each length of pipe immediately after it has been installed, or check it at any time after

installation.

- B. Inspect pipe joints and verify that they have been properly installed and made up, and free from sags, high spots, and excessive deflections.
- C. Perform leakage tests in accordance with Section 01 6660 and make any repairs and replacements necessary to meet the stipulated limits.

3.11 ADJUSTING AND CLEAN

- A. Any section of piping that is found defective in material, alignment, grade, joint or otherwise, shall be corrected.
- B. In the event that dirt, debris or any other foreign material has entered any portion of the piping, flush the piping with clean water. Continue the flushing process until the piping is clean, as determined by Engineer.

3.12 WATER SERVICE CONNECTION RECORDS

- A. Install building connections at all buildings indicated by a symbol on the plan and/or profile as described in the General Legend and as detailed on the Drawings. The Engineer will determine the actual location of building connections in the field on the basis of the most convenient and economical location to provide water service to each structure or lot to be serviced. When locations are determined in the field, they will be provided to the Contractor in advance of the pipe laying.
- B. Horizontal Ties - Measure and record 3 ties to the curb stop and to the end of each water service. When possible, these ties shall be to the building to be served by the service; otherwise, to permanent, physical objects on the same side of the street as the end of the water service.
- C. Vertical Ties - Measure the depth of each water service and record. Depths shall be measured from the pipe centerline to ground surface. Also, provide centerline elevations, using the same datum as that used on the Drawings. Accuracy of vertical measurements shall be plus or minus 1".
- D. Corporation and Curb Stops - Record the pipe station for each corporation stop installed.
- E. Other Recordings - Record length of each water service and other pertinent information, as required on the SKETCH OF WATER SERVICE CONNECTION.
- F. Records - Clearly and legibly record the above data on a SKETCH OF WATER SERVICE CONNECTION form. Submit duplicate copies of records to Engineer's field office within 48 hours after water services are installed.

END OF SECTION

SECTION 33 9010

WATER TREATMENT EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Control systems, booster pumps, hydro-pneumatic tanks, PFAS tanks and media, meters, chlorination system, and 5,000 gallon storage tanks.

1.02 RELATED SECTIONS

- A. Section 01600 - Product Requirements
- B. Section 02315 - Excavation
- C. Section 02316 - Fill and Backfill
- D. Section 02605 – Pipe Schedule
- E. Division 15 - Mechanical
- F. Division 26 - Electrical

1.03 GENERAL DESCRIPTION

- A. The Contractor shall furnish and install, as shown on the Drawings, a water system complete with all needed equipment. The principal items of the water system equipment shall include a pressure tank, cation exchange treatment system, meters, a chlorination system, three (3) 5,000-gallon storage tanks, controls, level sensors, and appurtenances as shown on the Drawings and specified herein.
- B. Pump requirements are specified in Pump Selection on the Plans. The existing booster pumps and pressure tanks shall be used as shown on the Drawings.

1.04 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Name and address of firm who will be responsible for servicing the water system, if required, after it is operational, the manufacturer's approval of that firm and a statement on the availability of parts, stocking practices, estimated number of hours necessary to arrive at the Project site to provide service under different circumstances and any limitations.
- C. Product Data: Provide shop drawings, catalog cuts and technical data on materials and equipment.
- D. Manufacturer's Certificate of Compliance: Certify that products of this section meet or exceed specified requirements.
- E. Manufacturer's Instructions: Include installation details for all components and indicate interface connection points for other electrical, process and telemetry work.

- F. Manufacturer's Field Reports: Include all field startup reports and/or field performance test data.
- G. Manufacturer's Operation Data: Including startup, shutdown and troubleshooting guides.
- H. Manufacturer's Maintenance Data: Including suggested maintenance schedule and list of recommended spare parts.
- I. Manufacturer's Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer. A minimum 1 year manufacturer warranty is required.

1.05 QUALITY ASSURANCE

- A. All instrumentation, electrical equipment and control panels must be U.L. or other recognized testing laboratory listed and labeled as complete units.
- B. Furnish the services of a competent field representative, or multiple field representatives if more than one supplier is involved, of the water system components (pressure tank, cation exchange treatment system, meters, chlorination system, 5,000-gallon storage tanks, controls, level sensors, and appurtenances) suppliers as follows:
 1. One day at the Project site, if required by the Contractor or Engineer, for the purpose of providing instructions on proper installation and/or inspection procedures.
 2. A sufficient amount of time at the Project site to inspect the final installation, make a pre-start up inspection of all components and perform the initial startup of the components.
 3. A sufficient amount of time at the Project site to perform field testing of the complete water system to verify the water system's required performance.
 4. During the one-year warranty period, recheck the system, recalibrate and adjust equipment, answer Owner's and Operator's questions, and review O&M procedures.
 5. Cost of the above visits shall be included in the Contract Price. These visits are in addition to any visits required by Contractor for any reason.
 - a. After installations are completed, the water system shall be completely operational and shall perform as specified.
 - b. Electrical work shall conform to the National Electric Code.
 - c. Excessive or abnormal vibration of any kind is unacceptable. Provide vibration isolators where required to protect all equipment and instrumentation.

1.06 DELIVERY, STORAGE, AND PROTECTION

- A. Deliver, handle and store all components at the project site in manufacturer's original, undamaged shipping containers, with tags and labels intact and legible.
- B. Store all components under cover protected from the weather and other construction activities and elevated above grade.

- C. Do not use pumps or accessories for any other construction related activity except for field testing to verify proper operations.

1.07 PROJECT CONDITIONS

- A. Coordinate electrical power installation with the power company and coordinate phone service with the phone company.

1.08 WARRANTY

- A. See Section 01780 - Closeout Submittals, for additional warranty requirements.
- B. For a period of 1 year from date of Substantial Completion, Contractor shall repair or replace any water system component that has been found defective in materials or workmanship under normal conditions of use and maintenance. Guarantee need not cover alterations by Owner, damage from accidents, abuse and vandalism, nor Acts of God. Manufacturer's liability shall be limited to the cost of materials and installation.

PART 2 PRODUCTS

2.01 ACCEPTABLE PRODUCTS AND MANUFACTURERS

- A. Remote Terminal Unit: MyDro 850 with Tank & Well Package by Mission Communications LLC, Norcross, Ga (678) 961-3062, www.123mc.com or approved equal. The design is based on Mission equipment; the contractor is responsible for modifying the design if another manufacturer is chosen.
- B. Variable Frequency Drive Controller: VFDC 4100 by Primex Controls, Detroit Lakes, MN (218) 847-1317, www.primexcontrols.com or approved equal. The design is based on Primex equipment; the contractor is responsible for modifying the design if another manufacturer is chosen.
- C. Hydropneumatic Tanks: JOPR-22-080 by The John Wood Company, Oaks, PA, (610) 666-1220, www.johnwood.com or approved equal. The design is based on equipment from The John Wood Company; the contractor is responsible for modifying the design if another manufacturer is chosen.
- D. Storage Tanks: 42043 or 42044 5000-gallon tank by Norwesco, Mound, MN, (800) 3283420, www.norwesco.com or approved equal. The design is based on this tank from Norwesco; the contractor is responsible for modifying the design if another manufacturer is chosen.
- E. Booster Pumps: 1.5WH (A5809) by Cornell Pump LLC, Clackamas, OR, (503)653-330, cornellpump.com or approved equal. The design is based on this booster pump from Cornell; the contractor is responsible for modifying the design if another manufacturer is chosen.
- F. High Accuracy Submersible Level Transmitter: Acculevel by Keller America, Newport News, VA (877) 253-5537, Kelleramerica.com or approved equal. The design is based on equipment from this manufacturer; the contractor is responsible for modifying the design if another manufacturer is chosen.

- G. High Accuracy Digital Pressure Transmitter: Preciseline by Keller America, Newport News, VA (877) 253-5537, Kelleramerica.com or approved equal. The design is based on equipment from this manufacturer; the contractor is responsible for modifying the design if another manufacturer is chosen.
- H. Level Controller: SP6R-X by SJE Inc., Detroit Lakes, MN (888) 342-5753, sjeinc.com or approved equal. The design is based on SJE equipment; the contractor is responsible for modifying the design if another manufacturer is chosen.
- I. Radar Level Sensor: VegaPULS11 with mounting bracket by Vega Americas, Inc., Mason, OH (513)272-0131, vega.com or approved equal. The design is based on Vega equipment; the contractor is responsible for modifying the design if another manufacturer is chosen.
- J. PFAS Treatment Tanks: 16" x 65" polyglass tanks by Clack, Pentair or approved equal. Tanks are to have an in/out head adapted to insert fittings for hose connections to ball valves. Hoses are to be long enough to accommodate varying tank heights when exchanging tanks. Each six tank section is to be plumbed in reverse return. The design is based on equipment from these manufacturers; the contractor is responsible for modifying the design if another manufacturer is chosen.
- K. PFAS Treatment Media: Purolite PFA694EBF, Resintech SIR-110-HP or approved equal. Each tank is to have underbed gravel and 5 cubic feet of PFAS treatment media. The design is based on media from these manufacturers; the contractor is responsible for modifying the design if another manufacturer is chosen.
- L. Chlorination System: Econ E20PHH solution feed with 100-gallon day tank by Stenner Pumps, Jacksonville, FL (800) 683-2378, stenner.com or approved equal. The design is based on equipment from this manufacturer; the contractor is responsible for modifying the design if another manufacturer is chosen.
- M. Acceptable manufacturers for the meter are Signet or approved equal. The drawing layout is based on Signet equipment; the contractor is responsible for modifying the layout if another manufacturer is chosen.
- N. To the greatest extent possible, individual components and accessories shall be the product of a single manufacturer or supplier.

2.02 GENERAL OPERATING CONDITIONS

- A. System performance requirements are specified on the Drawings. The system shall be capable of meeting the required operating conditions.

2.03 SPECIAL TOOLS AND SPARE PARTS

- A. Provide one set of special tools necessary for the proper operation and maintenance of the equipment, in a hardwood or metal toolbox.
- B. Provide spare parts as recommended by the manufacturer.
- C. Provide one spare control valve and one spare brine tank for the cation exchange

treatment system.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install as detailed on the Drawings and in accordance with manufacturer's instructions.
- B. Prior to shipment and installation, all station components shall be factory inspected for quality and tested for proper function and freedom from defects. Any deficiencies or irregularities shall be corrected at the factory. Automatic controls shall be adjusted to approximate job requirements.
- C. After field installation and start-up, all surfaces shall be cleaned and any paint damage touched up.

3.02 STARTUP

- A. After the installation is complete, the Contractor shall provide the services of a factory trained representative for a maximum period of one day to perform initial start-up of the water system and to instruct the owner's operating personnel in the operation and maintenance of the equipment. The required copies of the O&M manuals will be supplied to the owner prior to initial operation. See quality assurances section also.
- B. The Contractor shall provide a written report to the Engineer to document the work that was performed during start-up.
- C. The Contractor shall provide the services of a factory trained representative for a maximum period of one day during the one-year warranty period, to recheck the system, to recalibrate and adjust equipment, review O&M procedures, and answer Owner's questions.
- D. The cost of the above visits shall be included in the Contract Price. These visits are in addition to any visits required by the Contractor for any reason.

END OF SECTION



LEGEND:

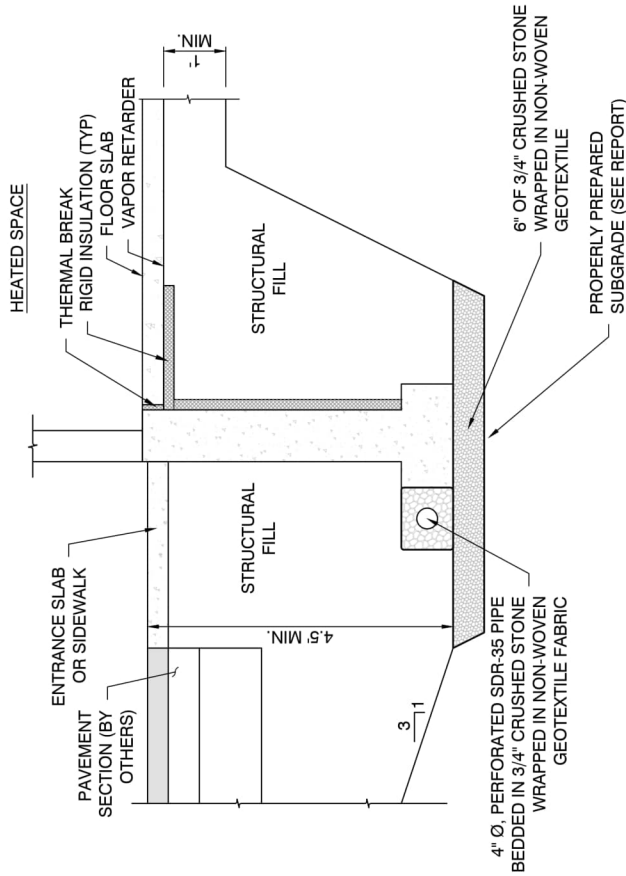
- APPROXIMATE BORING LOCATION
- APPROXIMATE PROBE LOCATION

NOTES:

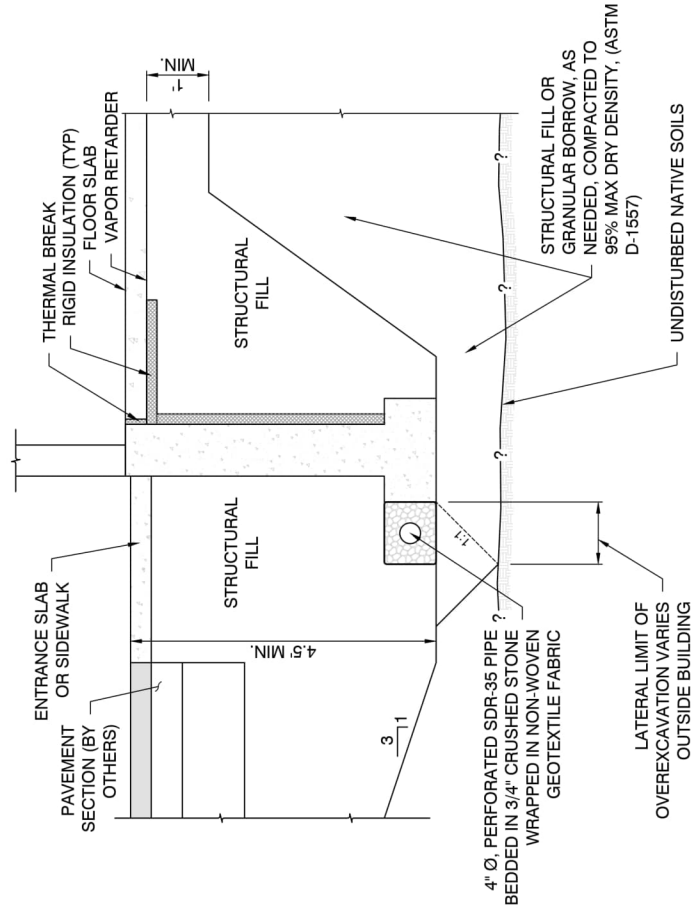
1. EXPLORATION LOCATION PLAN WAS PREPARED FROM A SCALE PLAN OF THE SITE PROVIDED BY DUBOS & KING, INC.
2. THE EXPLORATIONS WERE SELECTED AND LOCATED IN CONJUNCTION WITH THE PROPOSED WATER TREATMENT BUILDING, USING A MAPPING GRADE GNSS RECEIVER.
3. THIS PLAN SHOULD BE USED IN CONJUNCTION WITH THE PROPOSED WATER TREATMENT BUILDING DESIGN REPORT ASSOCIATED WITH THE PROPOSED WATER TREATMENT BUILDING, PREPARED BY DUBOS & KING, INC.
4. THE LOCATION OF THE EXPLORATIONS IS IN RELATION TO THE EXISTING CONDITIONS AND PROPOSED CONSTRUCTION AND IS NOT TO BE USED FOR CONSTRUCTION.



S.W. COLE
 CONSULTING ENGINEERS, INC.
 DUBOIS & KING, INC.
EXPLORATION LOCATION PLAN
 PROPOSED WATER SYSTEM CONSOLIDATION
 66 CUTLER ROAD, EAST MACHIAS, MAINE
 Job No.: 24-0315 Scale: 1" = 40'
 Date: 04/17/2024 Sheet: 1



FOUNDATIONS BEARING ON NATIVE SOIL



FOUNDATIONS BEARING ON COMPACTED FILL

- NOTE:
1. UNDERDRAIN INSTALLATION AND MATERIAL GRADATION RECOMMENDATIONS ARE CONTAINED WITHIN THIS REPORT.
 2. DETAIL IS PROVIDED FOR ILLUSTRATIVE PURPOSES ONLY, NOT FOR CONSTRUCTION.



S.W. COLE
ENGINEERING, INC.

DUBOIS & KING, INC.

FOUNDATION DETAIL SKETCH

PROPOSED WATER SYSTEM CONSOLIDATION
WASHINGTON ACADEMY
66 CUTLER ROAD, EAST MACHIAS, MAINE

Job No.: 24-0315 Scale: Not to Scale
Date: 04/11/2024 Sheet: 2