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Sludge Handling Improvements
Project Manual

Town of Putnam
Putnam, Connecticut

September 2026

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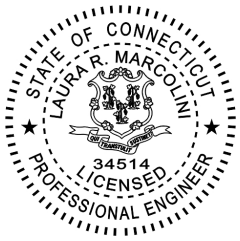
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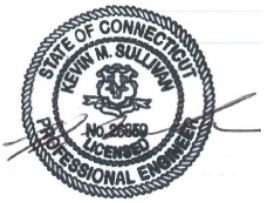
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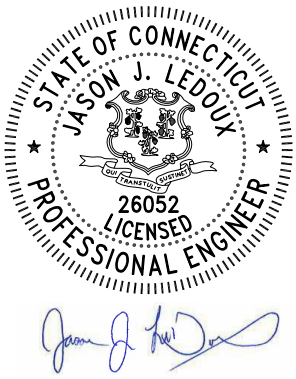
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ARTICLE 1—DEFINED TERMS

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 Bidder may register as a plan holder and obtain complete sets of Bidding Documents, in the number and format stated in the Advertisement or invitation to bid, from the Issuing Office. Bidders may rely that sets of Bidding Documents obtained from the Issuing Office are complete, unless an omission is blatant. Registered plan holders will receive Addenda issued by Owner.

2.04 *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 Version **[2025.001.20693]** or later. 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

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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 Bidder is to submit the following information with its Bid to demonstrate Bidder's qualifications to perform the Work:

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 No requirement in this Article 3 to submit information will prejudice the right of Owner to seek additional pertinent information regarding Bidder's qualifications.

ARTICLE 4—PRE-BID CONFERENCE

4.01 A 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. Proposals will not be accepted from Bidders who do not attend the conference. It is each Bidder's responsibility to sign in at the pre-bid conference to verify its participation. Bidders must sign in using the name of the organization that will be submitting a Bid. A list of qualified Bidders that attended the pre-bid conference and are eligible to submit a Bid for this Project will be issued in an Addendum.

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*

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1. The Supplementary Conditions identify the following regarding existing conditions at or adjacent to the Site:

    a. Those reports of explorations and tests of subsurface conditions at or adjacent to the Site that contain Technical Data.

    b. Those drawings known to Owner 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.

    c. Reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site.

    d. Technical Data contained in such reports and drawings.

2. If the Supplementary Conditions do not identify Technical Data, the default definition of Technical Data set forth in Article 1 of the General Conditions will apply.

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 *Site Visit and Testing by Bidders*

A. A Site visit is scheduled following the pre-bid conference. Maps to the Site will be available at the pre-Bid conference.

B. 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.

C. Bidder is not required to conduct any subsurface testing, or exhaustive investigations of Site conditions.

5.04 *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.

5.05 *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

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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. **Albert Wait, Project Engineer**
Fuss &O'Neill, Inc.
1 Financial Plaza, 15th Floor
Hartford, CT 06103
albert.wait@fando.com
(860) 783-4666

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 **Five (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

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Contract or 61 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.

ARTICLE 11—SUBCONTRACTORS, SUPPLIERS, AND OTHERS

11.01 A Bidder must be prepared to retain specific Subcontractors and Suppliers for the performance of the Work if required to do so by the Bidding Documents or in the Specifications. If a prospective Bidder objects to retaining any such Subcontractor or Supplier and the concern is not relieved by an Addendum, then the prospective Bidder should refrain from submitting a Bid.

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

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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.

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

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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 *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.

13.02 *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 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.

14.02 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

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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

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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.

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 If the Contract is to be awarded, Owner will consider the funding available, and will award the Contract, to the successful bidder of one of the following combinations of Base Bid and Alternates.

A. BASE BID

18.08 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 **Connecticut** state sales and use taxes on materials and equipment to be incorporated in the Work. (Exemption No. **06-6002071**). Said taxes must not be included in the Bid. Refer to Paragraph SC-7.10 of the Supplementary Conditions for additional information.

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SECTION 00 31 32
GEOTECHNICAL INFORMATION

PART 1 - GENERAL

1.01 SUBSURFACE AND PHYSICAL CONDITIONS

A. Reports of explorations and tests of subsurface conditions at or contiguous to the Site that the Engineer has used in preparing the Contract Documents.

1. A copy of the boring log is attached on the following pages.

    a. The boring log indicates conditions at the location of the boring only. Subsurface conditions encountered during construction may vary from those shown in the log.

    b. Ground water levels indicated are those existing at time of subsurface investigation and do not represent permanent groundwater levels.

B. Limited Reliance by Contractor on Technical Data Authorized: Contractor may rely upon the general accuracy of the “technical data”, but such reports and drawings are not Contract Documents. Except for such reliance on such “technical data,” Contractor may not rely upon or make any Claim against Owner, Engineer, or any of Engineer’s Consultants 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; or

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.

See attached data on following pages.

WELTI GEOTECHNICAL, P.C.

227 Williams Street · P.O. Box 397
Glastonbury, CT 06033-0397

(860) 633-4623 / FAX (860) 657-2514

April 24, 2025

Mr. Kevin M. Flood, P. E.
Associate
Fuss & O'Neill, Inc.
One Financial Center 15th Floor
Hartford, CT 06103

Re: **Geotechnical Study for Proposed Gravity Thickener and Split Box at Putnam WPCF, Kennedy Road, Putnam, CT**

Dear Kevin:

1.0 Herewith are boring data pertaining to the above. Two borings were drilled at the proposed facility to a depth of 21.5 feet. The boring locations are shown on the attached plan. *The borings were drilled by Clarence Welti Associates, Inc. and sampling was conducted by this firm solely to obtain indications of subsurface conditions as part of a geotechnical exploration program. No services were performed to evaluate subsurface environmental conditions.*

1.1 Laboratory testing included grain size gradation tests on three soil samples from the borings. The reports for those tests are included in the Appendix.

2.0 The **Subject Project** will include construction of a 40 feet diameter Gravity Thickener Tank, placed at a depth of about 13 feet below the existing grades, and an adjacent Splitter Box with piping. The proposed tank is about 5 feet from an existing tank, which is presumably at 13 feet below grade. The major concern is the water table, which was at about 9 feet below grade at the completion of the borings. It is assumed that splitter box will be above the ground water level

3.0 Geologically the natural soils on the site consist of glacial lake deposits, which abut the Quinebaug River. The lake deposits, which are below about 9 feet of existing fill, consist of fine to coarse sand with some gravel and little silt, atop fine to medium sand and silt with trace to little gravel.

3.1 The **Soils Cross Section** from the borings is generally as follows:

Splitter Box (see boring B-1)

Topsoil to 6"

FILL; fine to coarse SAND, little to some Silt, little Gravel to 6 feet, medium compact

FILL; fine to coarse SAND, little Gravel, trace Silt to 8.5 feet, loose

Fine to coarse SAND, some Gravel, little Silt to 18 feet, medium compact to dense

Fine to medium SAND and SILT, trace Gravel to 21+ feet, medium compact

Gravity Thickener Tank (see boring B-2)

Topsoil to 3"

FILL; fine to coarse SAND, little to some Silt, little Gravel to 2 feet, medium compact

FILL; fine SAND, little to some Silt to 9.5 feet, loose

Fine to coarse SAND, some Gravel, little Silt to 13 feet, medium compact to dense

Fine to medium SAND and SILT, little Gravel to 21+ feet, medium compact

3.2 The **Water Table,** was evident in the boreholes at 8.5 to 9.8 feet below the existing grades at the completion of the borings. The soils below about 8 feet were saturated in the borings.

4.0 The **Criteria for Foundation Type and Loading** for definitive structures are as follows:

1. The maximum total settlement should not exceed 3/4" and the maximum differential settlement should not exceed ½ the maximum settlement over a length of 50 feet.

2. The structure should address the seismic section of the building code, where applicable.

These criteria are generally applied to structures of similar character. If the owner, the architect, the engineers find the criteria as unacceptable, the writer shall be informed to permit additional geotechnical input.

4.1 Regarding item 2 (above) the seismic site soil profile classification is "D". The mapped MCE spectral response acceleration values for Putnam, CT are S_1=0.055 for 1 second period and S_S=0.184 for short periods.

5.0 Based the presence of nearby piping it appears that a circular cofferdam could be required. The sheeting would be driven into the stratum of fine to medium sand and silt to allow for dewatering inside the cofferdam. If the piping is not impacted from the excavation, there should be an initial 6 feet of excavation. Well points would be placed from that level. De-watering should be to at least 1 foot below the proposed tank bottom. If cofferdam is used, it should be left in place. Extracting sheeting could cause possible settlement of the proposed tank and the adjacent tank.

5.1 A minimum 8″ layer of crushed 3/8″ stone should be placed beneath the tank.

5.2 Lateral loading on tank walls should be with at-rest loading, which is equal to 0.45 x the soil weight (assume 125 pcf).

5.3 The **splitter box and piping** should be on the natural inorganic soil or on a controlled fill placed after the removal of existing fills to at least 3 feet below the bottom of the splitter box and piping. The controlled fill should conform to section 6.0 below and should extend laterally for a distance equal to the depth of fill below the splitter box and piping.

5.4 In summary the design parameters for the proposed construction are as follows:

Parameter	Value
Soil Weight (Backfill)	125 pcf
At Rest Coefficient	0.45
Passive Coefficient	4.0
Active Coefficient	0.28
Allowable Bearing Pressure	2.0 Ton/sf
Frost Protection Depth	3.5 feet
Seismic Site Soil Profile Classification	D
Mapped MCE Spectral Response Acceleration for Short Periods, S_s	0.184
Mapped MCE Spectral Response Acceleration for One Second Period, S_1	0.055

6.0 Controlled structural fill and backfill of the tank should conform to the following gradation or be 3/8" crushed stone:

Percent Passing	Sieve Size
100	1.5"
50 -100	3/4"
25 - 75	No.4

The fraction passing the No.4 sieve should have less than 15%, passing the No.200 sieve.

All backfill and fill must be compacted to at least 95% of modified optimum density.

Some on-site excavation may conform to the above gradation

7.0 The soils will fall in OSHA Class C. This will require that all excavations exceeding 5 feet in depth, which are not shored, to the cut back to 1.5H to1.0V.

8.0 This report has been prepared for specific application to the subject project in accordance with generally accepted soil and foundation engineering practices. No other warranty, express or implied, is made. In the event that any changes in the nature, design and location of structures are planned, the conclusions and recommendations contained in this report should not be considered valid unless the changes are reviewed and conclusions of this report modified or verified in writing.

The analyses and recommendations submitted in this report are based in part upon data obtained from referenced explorations. The extent of variations between explorations may not become evident until construction. If variations then appear evident, it will be necessary to re-evaluate the recommendations of this report.

Welti Geotechnical, P.C., should perform a general review of the final design and specifications in order that geotechnical design recommendations may be properly interpreted and implemented as they were intended.

If you have any questions, please call me.

Very truly yours,

Max Welti

Max Welti, P.E
President, Welti Geotechnical, P. C.

Clarence Welti

Clarence Welti, PhD, P. E.
Vice President

APPENDIX

Test Boring Location Plan
+
Test Boring Data
+
Laboratory Test Results

RELOCATE LIGHT POLE (TYP.)

RELOCATE DISCHARGE FROM EXISTING GRAVITY THICKENER AND CONNECT DISCHARGE OF PROPOSED GRAVITY THICKENER

RELOCATE WATER MAIN AND HYDRANT

PROPOSED GRAVITY THICKENER WITH COVER

CONNECT TO PIPING FOR EXISTING PUMP FEEDING BELT FILTER PRESS

RELOCATE ELECTRICAL CONDUITS (TYP.)

REMOVE AND DISPOSE OF ODOR CONTROL SYSTEM

PROPOSED SPLITTER BOX

PROPOSED DOGHOUSE MANHOLE FOR RAS/WAS FLOW

CONNECT RAS & WAS FLOWS FROM PUMP STATION TO DOGHOUSE MANHOLE

RELOCATE PRIMARY SLUDGE DISCHARGE

B-1

B-2

TEST BORING LOCATIONS
CLARENCE WELTI ASSOCIATES, INC.
4/17/25

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER
			WTD	KMF

SEAL

SEAL

SCALE:
HORZ.: 1" = 10'
VERT.:
DATUM:
HORZ.:
VERT.:
10 5 0 10
GRAPHIC SCALE

FUSS & O'NEILL
146 HARTFORD ROAD
MANCHESTER, CONNECTICUT 06040
860.646.2469
www.fando.com

TOWN OF PUTNAM

SITE PLAN

GRAVITY THICKENER EVALUATION

PUTNAM CONNECTICUT

PROJ. No.: 1998386.P90
DATE: APRIL 2024

CS-101

File: J:\DWG\P98\98386\P90\Civil\Plan\1998386P90_STP01.dwg Layout: CS-101 (2) Plotted: 2024-05-02 8:25 AM Saved: 2024-05-01 2:03 PM User: Walter.Dylag
PC3: AUTOCAD PDF (GENERAL DOCUMENTATION).PC3 STB/CTB: FO.STB
LAYER STATE:
MS VIEW:

CLARENCE WELTI ASSOC., INC.
P.O. BOX 397
GLASTONBURY, CONN 06033

CLIENT
FUSS & O'NEILL, INC.

PROJECT NAME
PROPOSED GRAVITY THICKENER AND SPLITTER BOX AT WPCF

LOCATION
KENNEDY ROAD, PUTNAM, CT

	AUGER	CASING	SAMPLER	CORE BAR.
TYPE	HSA		SS	
SIZE I.D.	3.75"		1.375"	
HAMMER WT.			140lbs	
HAMMER FALL			30"	

OFFSET
LINE & STA.
LONGITUDE
LATITUDE

SURFACE ELEV. 226

HOLE NO. B-1

GROUND WATER OBSERVATIONS
AT 8.5 FT. AFTER 0 HOURS
AT FT. AFTER HOURS

START DATE 4/17/25
FINISH DATE 4/17/25

DEPTH	SAMPLE NO.	SAMPLE BLOWS/6"	SAMPLE DEPTH	A	STRATUM DESCRIPTION + REMARKS	ELEV.
0	1	2-7-7-11	0.0'-2.0'		TOPSOIL 0.50	225
					GREY/BR.FINE-CRS.SAND, LITTLE TO SOME SILT, LITTLE GRAVEL - FILL	
	2	13-9-7-5	2.0'-4.0'			
5	3	3-3-4-4	5.0'-7.0'		6.0	220
					LIGHT BR. FINE-CRS.SAND, LITTLE GRAVEL, TRACE SILT - FILL	
					8.5	
					GREY/BR.FINE-CRS.SAND, SOME GRAVEL, LITTLE SILT	
10	4	8-13-18-21	10.0'-12.0'			215
15	5	10-13-8	15.0'-16.5'			210
					19.0	
					GREY/BR.FINE-MED.SAND AND SILT, TRACE GRAVEL	
20	6	6-8-13	20.0'-21.5'			205
					21.5	
					BOTTOM OF BORING @ 21.5'	
25						200
30						195
35						

LEGEND: COL. A:

SAMPLE TYPE: D=DRY A=AUGER C=CORE U=UNDISTURBED PISTON S=SPLIT SPOON

PROPORTIONS USED: TRACE=0-10% LITTLE=10-20% SOME=20-35% AND=35-50%

DRILLER: J. BREWER
INSPECTOR:

SHEET 1 OF 1

HOLE NO. **B-1**

CLARENCE WELTI ASSOC., INC.
P.O. BOX 397
GLASTONBURY, CONN 06033

CLIENT
FUSS & O'NEILL, INC.

PROJECT NAME
PROPOSED GRAVITY THICKENER AND SPLITTER BOX AT WPCF

LOCATION
KENNEDY ROAD, PUTNAM, CT

	AUGER	CASING	SAMPLER	CORE BAR.
TYPE	HSA		SS	
SIZE I.D.	3.75"		1.375"	
HAMMER WT.			140lbs	
HAMMER FALL			30"	

OFFSET
LINE & STA.
LONGITUDE
LATITUDE

SURFACE ELEV. 226

HOLE NO. B-2

GROUND WATER OBSERVATIONS
AT 9.8 FT. AFTER 0 HOURS
AT FT. AFTER HOURS

START DATE 4/17/25
FINISH DATE 4/17/25

DEPTH	SAMPLE NO.	SAMPLE BLOWS/6"	SAMPLE DEPTH	A	STRATUM DESCRIPTION + REMARKS	ELEV.
0	1	3-5-8-6	0.0'-2.0'		TOPSOIL 0.25	225
					BR.FINE-CRS.SAND, LITTLE TO SOME SILT, LITTLE GRAVEL - FILL	
	2	2-5-4-7	2.0'-4.0'		2.0 BR.FINE SAND, LITTLE TO SOME SILT - FILL	
5	3	3-3-4-4	5.0'-7.0'			220
	4	0-0-1-1	7.0'-9.0'			
	5	0-16-20-20	9.0'-11.0'		9.0 BR.FINE SAND, TRACE PEAT & ROOTS 9.5	
10					GREY/BR.FINE-CRS.SAND, SOME GRAVEL, LITTLE SILT	215
					13.0 GREY/BR.FINE SAND, SOME SILT	
15	6	5-8-7	15.0'-16.5'			210
					18.0 GREY/BR.FINE-MED.SAND AND SILT, LITTLE GRAVEL	
20	7	7-8-8	20.0'-21.5'			205
					21.5 BOTTOM OF BORING @ 21.5'	
25						200
30						195
35						

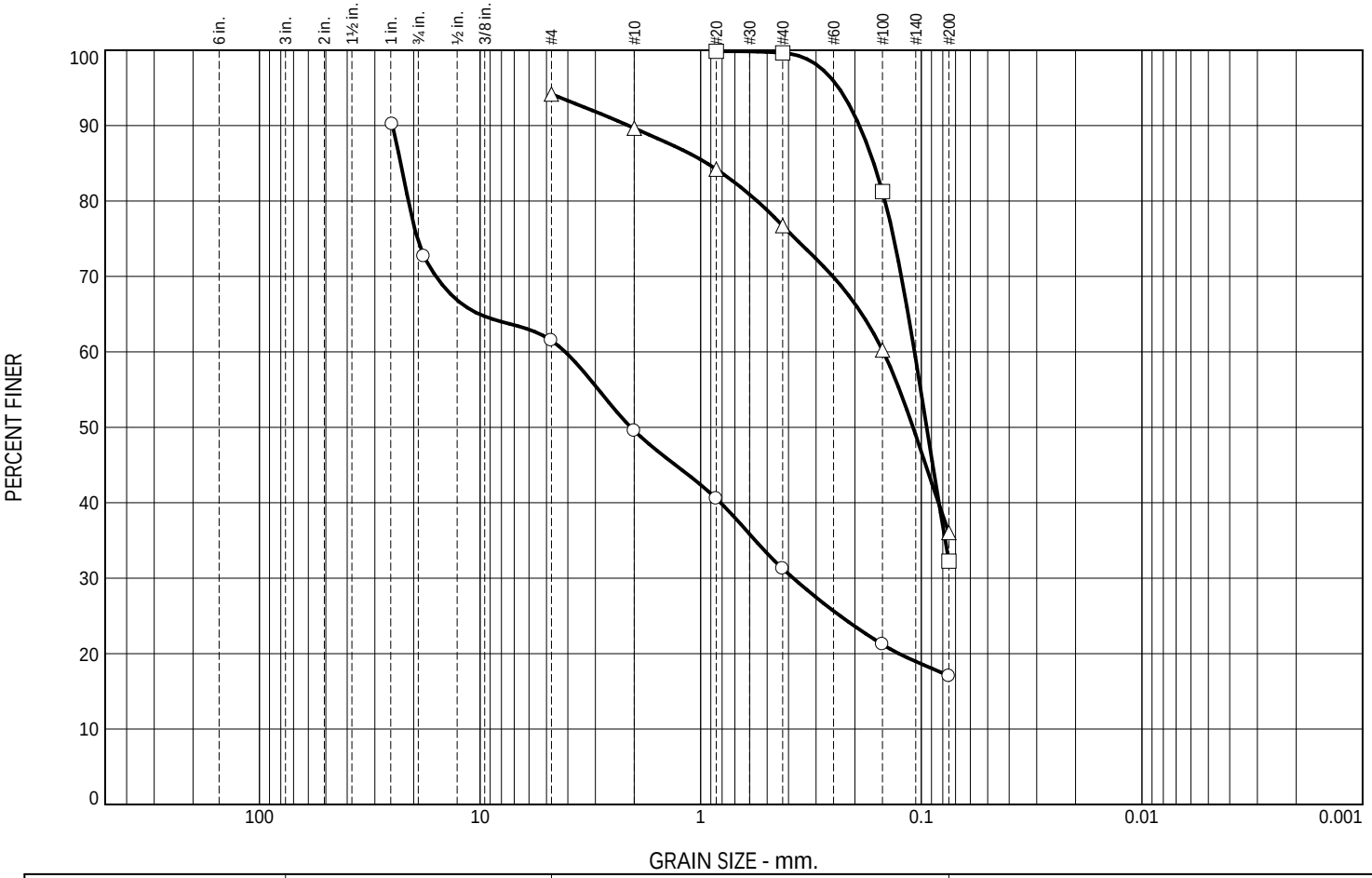
LEGEND: COL. A:
SAMPLE TYPE: D=DRY A=AUGER C=CORE U=UNDISTURBED PISTON S=SPLIT SPOON
PROPORTIONS USED: TRACE=0-10% LITTLE=10-20% SOME=20-35% AND=35-50%

DRILLER: J. BREWER
INSPECTOR:

SHEET 1 OF 1 | HOLE NO. **B-2**

Particle Size Distribution Report

ASTM D422



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○			13.0	12.0	18.2	14.3	17.0	
□						67.3	32.3	
△				4.5	13.0	40.7	36.0	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			22.9016	4.1104	2.0746	0.3805				
□			0.1643	0.1074	0.0945					
△			0.9360	0.1486	0.1091					

Material Description	Test Date	USCS	NM
○ water content = 11.0% □ water content = 28% △ water content = 22%			

Project No. Client: FUSS & O'NEILL, INC.

Project: PROPOSED GRAVITY THICKENER AND SPLITTER BOX AT WPCF

○Source of Sample: B-2 Depth: 9.0 Sample Number: 5

□Source of Sample: B-2 Depth: 15.0 Sample Number: 6

△Source of Sample: B-2 Depth: 20.0 Sample Number: 7

Remarks:

CLARENCE WELTI ASSOCIATES, INC.

Figure

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: **Town of Putnam, CT**

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;

E. Contractor's license number as evidence of Bidder's State Contractor's License or a covenant by Bidder to obtain said license within the time for acceptance of Bids;

F. Required Bidder Qualification Statement with supporting data; and

G. Non-collusion Affidavit of Bidder

ARTICLE 3—TIME OF COMPLETION

3.01 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.

3.02 Bidder accepts the provisions of the Agreement as to liquidated damages.

ARTICLE 4—BIDDER'S ACKNOWLEDGEMENTS: ACCEPTANCE PERIOD, INSTRUCTIONS, AND RECEIPT OF ADDENDA

4.01 *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.

4.02 *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.

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4.03 *Receipt of Addenda*

A. Bidder hereby acknowledges receipt of the following Addenda:

Addendum Number	Addendum Date

ARTICLE 5—BIDDER'S REPRESENTATIONS AND CERTIFICATIONS

5.01 *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

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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.

5.02 *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.

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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) _____

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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: **Town of Putnam, CT**

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;

E. Contractor's license number as evidence of Bidder's State Contractor's License or a covenant by Bidder to obtain said license within the time for acceptance of Bids;

F. Required Bidder Qualification Statement with supporting data; and

G. Non-collusion Affidavit of Bidder

ARTICLE 3—TIME OF COMPLETION

3.01 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.

3.02 Bidder accepts the provisions of the Agreement as to liquidated damages.

ARTICLE 4—BIDDER'S ACKNOWLEDGEMENTS: ACCEPTANCE PERIOD, INSTRUCTIONS, AND RECEIPT OF ADDENDA

4.01 *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.

4.02 *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.

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4.03 *Receipt of Addenda*

A. Bidder hereby acknowledges receipt of the following Addenda:

Addendum Number	Addendum Date

ARTICLE 5—BIDDER'S REPRESENTATIONS AND CERTIFICATIONS

5.01 *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

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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.

5.02 *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.

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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) _____

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SECTION 004110
BID SCHEDULE

Amount shall be shown in both words and figures. In case of discrepancy, the amount shown in words will govern.

BID ITEMS

Item No.	Item and Unit Price		Engineer's Estimate of Quantity	Computed Total
BID ITEMS				
1	**Mobilization and Project Closeout** at the Lump Sum Price of _____ Dollars and _____ Cents ($)	LS	1	$ _____
2	**Field Office** at the per Month Price of _____ Dollars and _____ Cents ($)	MO	12	$ _____
3	**Silt Fence** at the per Linear Foot Price of _____ Dollars and _____ Cents ($)	LF	400	$ _____
4	**Straw Waddles / Silt Sock** at the per Linear Foot Price of _____ Dollars and _____ Cents ($)	LF	400	$ _____
5	**Record Drawings** at the Lump Sum Allowance of Five Thousand Dollars and zero Cents ($5,000.00)	LS	1	$ 5,000.00

BID ITEMS

Item No.	Item and Unit Price		Engineer's Estimate of Quantity	Computed Total
6	**Test Pits** at the per Cubic Yard Price of	CY	50	
	_____ Dollars			$ _____
	and _____ Cents ($)			
7	**Rock Excavation** at the per Cubic Yard Price of	CY	50	
	_____ Dollars			$ _____
	and _____ Cents ($)			
8	**Selective Demolition** at the Lump Sum Price of	LS	1	
	_____ Dollars			$ _____
	and _____ Cents ($)			
9	**Gravity Thickener and Appurtenances** at the Lump Sum Price of	LS	1	
	_____ Dollars			$ _____
	and _____ Cents ($)			
10	**Electrical Modifications** at the Lump Sum Price of	LS	1	
	_____ Dollars			$ _____
	and _____ Cents ($)			
11	**Yard Piping Modifications** at the Lump Sum Price of	LS	1	
	_____ Dollars			$ _____
	and _____ Cents ($)			

BID ITEMS

Item No.	Item and Unit Price		Engineer's Estimate of Quantity	Computed Total
12	**SCADA & Controls Allowance** at the Lump Sum Price of	LS	1	
	Twenty Thousand Dollars			$ 20,000.00
	and zero Cents ($20,000.00)			

TOTAL BASE BID $ _____

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BID BOND (DAMAGES FORM)

Bidder Name: Address *(principal place of business)*:	**Surety** Name: Address *(principal place of business)*:
Owner Name: **Town of Putnam** Address *(principal place of business)*: **200 School Street** **Putnam, CT 06260**	**Bid** Project *(name and location)*: **Town of Putnam** **4 Kennedy Drive** **Putnam, Connecticut 06260** Bid Due Date:
Bond Bond Amount: Date of Bond:	

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	Surety
_____ *(Full formal name of Bidder)*	_____ *(Full formal name of Surety) (corporate seal)*
By: _____ *(Signature)*	By: _____ *(Signature) (Attach Power of Attorney)*
Name: _____ *(Printed or typed)*	Name: _____ *(Printed or typed)*
Title: _____	Title: _____
Attest: _____ *(Signature)*	Attest: _____ *(Signature)*
Name: _____ *(Printed or typed)*	Name: _____ *(Printed or typed)*
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 any difference between the total amount of Bidder's Bid and the total amount of the Bid of the next lowest, responsible Bidder that submitted a responsive Bid, as determined by Owner, for the work required by the Contract Documents, provided that:

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1.1. If there is no such next Bidder, and Owner does not abandon the Project, then Bidder and Surety shall pay to Owner the bond amount set forth on the face of this Bond, and

1.2. In no event will Bidder's and Surety's obligation hereunder exceed the bond amount set forth on the face of this Bond.

1.3. Recovery 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 will not in the aggregate exceed 120 days from 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 must 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.

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QUALIFICATIONS STATEMENT

ARTICLE 1—GENERAL INFORMATION

1.01 Provide contact information for the Business:

Legal Name of Business:			
Corporate Office			
Name:		Phone number:	
Title:		Email address:	
Business address of corporate office:			
Local Office			
Name:		Phone number:	
Title:		Email address:	
Business address of local office:			

1.02 Provide information on the Business's organizational structure:

Form of Business:	☐ Sole Proprietorship ☐ Partnership ☐ Corporation		
☐ Limited Liability Company ☐ Joint Venture comprised of the following companies:			
	1.		
	2.		
	3.		
Provide a separate Qualification Statement for each Joint Venturer.			
Date Business was formed:		State in which Business was formed:	
Is this Business authorized to operate in the Project location?	☐ Yes ☐ No ☐ Pending		

1.03 Identify all businesses that own Business in whole or in part (25% or greater), or that are wholly or partly (25% or greater) owned by Business:

Name of business:		Affiliation:	
Address:			
Name of business:		Affiliation:	
Address:			
Name of business:		Affiliation:	
Address:			

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1.04 Provide information regarding the Business's officers, partners, and limits of authority.

Name:		Title:	
Authorized to sign contracts: ☐ Yes ☐ No		Limit of Authority:	$
Name:		Title:	
Authorized to sign contracts: ☐ Yes ☐ No		Limit of Authority:	$
Name:		Title:	
Authorized to sign contracts: ☐ Yes ☐ No		Limit of Authority:	$
Name:		Title:	

ARTICLE 2—LICENSING

2.01 Provide information regarding licensure for Business:

Name of License:			
Licensing Agency:			
License No:		Expiration Date:	
Name of License:			
Licensing Agency:			
License No:		Expiration Date:	

ARTICLE 3—DIVERSE BUSINESS CERTIFICATIONS

3.01 Provide information regarding Business's Diverse Business Certification, if any. Provide evidence of current certification.

Certification	Certifying Agency	Certification Date
☐ Disadvantaged Business Enterprise		
☐ Minority Business Enterprise		
☐ Woman-Owned Business Enterprise		
☐ Small Business Enterprise		
☐ Disabled Business Enterprise		
☐ Veteran-Owned Business Enterprise		
☐ Service-Disabled Veteran-Owned Business		
☐ HUBZone Business (Historically Underutilized) Business		
☐ Other		
☐ None		

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ARTICLE 4—SAFETY

4.01 Provide information regarding Business's safety organization and safety performance.

Name of Business's Safety Officer:		
Safety Certifications		
Certification Name	Issuing Agency	Expiration

4.02 Provide Worker's Compensation Insurance Experience Modification Rate (EMR), Total Recordable Frequency Rate (TRFR) for incidents, and Total Number of Recorded Manhours (MH) for the last 3 years and the EMR, TRFR, and MH history for the last 3 years of any proposed Subcontractor(s) that will provide Work valued at 10% or more of the Contract Price. Provide documentation of the EMR history for Business and Subcontractor(s).

Year									
Company	EMR	TRFR	MH	EMR	TRFR	MH	EMR	TRFR	MH

ARTICLE 5—FINANCIAL

5.01 Provide information regarding the Business's financial stability. Provide the most recent audited financial statement, and if such audited financial statement is not current, also provide the most current financial statement.

Financial Institution:		
Business address:		
Date of Business's most recent financial statement:		☐ Attached
Date of Business's most recent audited financial statement:		☐ Attached
Financial indicators from the most recent financial statement		
Contractor's Current Ratio (Current Assets ÷ Current Liabilities)		
Contractor's Quick Ratio ((Cash and Cash Equivalents + Accounts Receivable + Short Term Investments) ÷ Current Liabilities)		

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ARTICLE 6—SURETY INFORMATION

6.01 Provide information regarding the surety company that will issue required bonds on behalf of the Business, including but not limited to performance and payment bonds.

Surety Name:			
Surety is a corporation organized and existing under the laws of the state of:			
Is surety authorized to provide surety bonds in the Project location?	☐ Yes ☐ No		
Is surety listed in "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" published in Department Circular 570 (as amended) by the Bureau of the Fiscal Service, U.S. Department of the Treasury? ☐ Yes ☐ No			
Mailing Address (principal place of business):			
Physical Address (principal place of business):			
Phone (main):		Phone (claims):	

ARTICLE 7—INSURANCE

7.01 Provide information regarding Business's insurance company(s), including but not limited to its Commercial General Liability carrier. Provide information for each provider.

Name of insurance provider, and type of policy (CLE, auto, etc.):			
Insurance Provider		Type of Policy (Coverage Provided)	
Are providers licensed or authorized to issue policies in the Project location?		☐ Yes ☐ No	
Does provider have an A.M. Best Rating of A-VII or better?		☐ Yes ☐ No	
Mailing Address (principal place of business):			
Physical Address (principal place of business):			
Phone (main):		Phone (claims):	

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ARTICLE 8—CONSTRUCTION EXPERIENCE

8.01 Provide information that will identify the overall size and capacity of the Business.

Average number of current full-time employees:	
Estimate of revenue for the current year:	
Estimate of revenue for the previous year:	

8.02 Provide information regarding the Business's previous contracting experience.

Years of experience with projects like the proposed project:				
As a general contractor:		As a joint venturer:		
Has Business, or a predecessor in interest, or an affiliate identified in Paragraph 1.03:				
Been disqualified as a bidder by any local, state, or federal agency within the last 5 years? ☐ Yes ☐ No				
Been barred from contracting by any local, state, or federal agency within the last 5 years? ☐ Yes ☐ No				
Been released from a bid in the past 5 years? ☐ Yes ☐ No				
Defaulted on a project or failed to complete any contract awarded to it? ☐ Yes ☐ No				
Refused to construct or refused to provide materials defined in the contract documents or in a change order? ☐ Yes ☐ No				
Been a party to any currently pending litigation or arbitration? ☐ Yes ☐ No				
Provide full details in a separate attachment if the response to any of these questions is Yes.				

8.03 List all projects currently under contract in Schedule A and provide indicated information.

8.04 List a minimum of three and a maximum of six projects completed in the last 5 years in Schedule B and provide indicated information to demonstrate the Business's experience with projects similar in type and cost of construction.

8.05 In Schedule C, provide information on key individuals whom Business intends to assign to the Project. Provide resumes for those individuals included in Schedule C. Key individuals include the Project Manager, Project Superintendent, Quality Manager, and Safety Manager. Resumes may be provided for Business's key leaders as well.

ARTICLE 9—REQUIRED ATTACHMENTS

9.01 Provide the following information with the Statement of Qualifications:

A. If Business is a Joint Venture, separate Qualifications Statements for each Joint Venturer, as required in Paragraph 1.02.

B. Diverse Business Certifications if required by Paragraph 3.01.

C. Certification of Business's safety performance if required by Paragraph 4.02.

D. Financial statements as required by Paragraph 5.01.

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E. Attachments providing additional information as required by Paragraph 8.02.

F. Schedule A (Current Projects) as required by Paragraph 8.03.

G. Schedule B (Previous Experience with Similar Projects) as required by Paragraph 8.04.

H. Schedule C (Key Individuals) and resumes for the key individuals listed, as required by Paragraph 8.05.

I. Additional items as pertinent.

This Statement of Qualifications is offered by:

Business: _____
(typed or printed name of organization)

By: _____
(individual's signature)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Date: _____
(date signed)

(If Business 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)

Address for giving notices:

_____

_____

_____

Designated Representative:

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Address:

_____

_____

_____

Phone: _____

Email: _____

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QUALIFICATIONS STATEMENT

Schedule A—Current Projects

Name of Organization				
Project Owner		Project Name		
General Description of Project				
Project Cost		Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager
Name				

Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)

	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Project Owner		Project Name		
General Description of Project				
Project Cost		Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager
Name				

Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)

	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Project Owner		Project Name		
General Description of Project				
Project Cost		Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager
Name				

Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)

	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

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QUALIFICATIONS STATEMENT

Schedule B—Previous Experience with Similar Projects

Name of Organization				
Project Owner		Project Name		
General Description of Project				
Project Cost		Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager
Name				

Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)

	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Project Owner		Project Name		
General Description of Project				
Project Cost		Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager
Name				

Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)

	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Project Owner		Project Name		
General Description of Project				
Project Cost		Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager
Name				

Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)

	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

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QUALIFICATIONS STATEMENT

Schedule B—Previous Experience with Similar Projects

Name of Organization				
Project Owner		Project Name		
General Description of Project				
Project Cost		Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager
Name				

Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)

	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Project Owner		Project Name		
General Description of Project				
Project Cost		Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager
Name				

Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)

	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Project Owner		Project Name		
General Description of Project				
Project Cost		Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager
Name				

Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)

	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

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QUALIFICATIONS STATEMENT

Schedule C—Key Individuals

Project Manager			
Name of individual			
Years of experience as project manager			
Years of experience with this organization			
Number of similar projects as project manager			
Number of similar projects in other positions			
Current Project Assignments			
Name of assignment		Percent of time used for this project	Estimated project completion date
Reference Contact Information (listing names indicates approval to contact named individuals as a reference)			
Name		Name	
Title/Position		Title/Position	
Organization		Organization	
Telephone		Telephone	
Email		Email	
Project		Project	
Candidate's role on project		Candidate's role on project	
Project Superintendent			
Name of individual			
Years of experience as project superintendent			
Years of experience with this organization			
Number of similar projects as project superintendent			
Number of similar projects in other positions			
Current Project Assignments			
Name of assignment		Percent of time used for this project	Estimated project completion date
Reference Contact Information (listing names indicates approval to contact named individuals as a reference)			
Name		Name	
Title/Position		Title/Position	
Organization		Organization	
Telephone		Telephone	
Email		Email	
Project		Project	
Candidate's role on project		Candidate's role on project	

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QUALIFICATIONS STATEMENT

Safety Manager			
Name of individual			
Years of experience as project manager			
Years of experience with this organization			
Number of similar projects as project manager			
Number of similar projects in other positions			
Current Project Assignments			
Name of assignment		Percent of time used for this project	Estimated project completion date
Reference Contact Information (listing names indicates approval to contact named individuals as a reference)			
Name		Name	
Title/Position		Title/Position	
Organization		Organization	
Telephone		Telephone	
Email		Email	
Project		Project	
Candidate's role on project		Candidate's role on project	

Quality Control Manager			
Name of individual			
Years of experience as project superintendent			
Years of experience with this organization			
Number of similar projects as project superintendent			
Number of similar projects in other positions			
Current Project Assignments			
Name of assignment		Percent of time used for this project	Estimated project completion date
Reference Contact Information (listing names indicates approval to contact named individuals as a reference)			
Name		Name	
Title/Position		Title/Position	
Organization		Organization	
Telephone		Telephone	
Email		Email	
Project		Project	
Candidate's role on project		Candidate's role on project	

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NON-COLLUSION AFFIDAVIT OF BIDDER

State of: _____

County of: _____, SS)

_____; being first duly sworn, deposes and says that:

1) He is (owner, partner, officer, representative or agent) of _____, the Bidder that has submitted the attached Bid:

2) He is fully informed regarding the preparation and contents of the attached Bid and of all pertinent circumstances regarding such Bid:

3) Such Bid is genuine and is not a collusive or sham Bid:

4) Neither the said Bidder nor any of its officers, partners, owner, agents, representatives, employees or parties in interest, including this affiant, has in any way colluded, conspired, connived, or agreed, directly or indirectly with any other Bidder, firm or person to submit a collusive or sham Bid in connection with the Contract for which the attached Bid has been submitted or to refrain from bidding in connection with such Contract, or has in any manner, directly or indirectly, sought by agreement or collusion or communication or conference with any other Bidder, firm or person to fix the price or prices in the attached Bid or of any Bidder, or to fix any overhead, profit or cost element of the bid price or the bid price of any other Bidder or to secure through any collusion, conspiracy, connivance or unlawful agreement any advantage with the Owner or any person interested in the proposed Contract.

5) The price quoted in the attached Bid is fair and proper and is not tainted by collusion, conspiracy, connivance or unlawful agreement on the part of the Bidder or any of its agents, representatives, owners, employees, or parties in interest.

Signed: _____

Title: _____

Subscribed and sworn before me this _____ day of _____ , 20 _____ .

Notary Public: _____

My Commission expires: _____

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NOTICE OF AWARD

Date of Issuance:		
Owner:	Town of Putnam, CT	Owner's Project No.:
Engineer:	Fuss & O'Neill, Inc.	Engineer's Project No. 01998386.P91
Project:	Sludge Handling Improvements	
Contract Name:		
Bidder:		
Bidder's Address:		

You are notified that Owner has accepted your Bid dated **October 15, 2026** for the above Contract, and that you are the Successful Bidder and are awarded a Contract for:

This project consists of the furnishing and installation of one (1) 30-ft diameter gravity thickener tank and mechanism, second Moyno pump in the lower level of solids handling building, reinforced fiberglass cover, instrumentation, SCADA and electrical improvements, yard piping, valves, water main relocation, and associated site restoration.

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.

Three (3) 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 **three (3)** 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. 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:	**Town of Putnam**
By *(signature)*:	_____
Name *(printed)*:	Brian Lynch
Title:	WPCA Superintendent

Copy: Engineer

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

This Agreement is by and between **Town of Putnam** ("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:

This project consists of the furnishing and installation of one (1) 30-ft diameter gravity thickener tank and mechanism, a second moyno pump in the lower level of solids handling building, reinforced fiberglass cover, instrumentation, SCADA and electrical improvements, yard piping, valves, water main relocation, and associated site restoration.

ARTICLE 2—THE PROJECT

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

This Project Consists of the Furnishing and Installation of one (1) 30-Ft Diameter Gravity Thickener tank and mechanism, reinforced fiberglass cover, SCADA and electrical improvements, yard piping, valves, water main relocation, and associated site restoration.

ARTICLE 3 - ENGINEER

3.01 The Owner has retained **Fuss & O'Neill 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.

ARTICLE 3—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.

4.03 *Contract Times: Days*

A. The Work will be substantially complete within **365** days after the date when the Contract Times commence to run as provided in Paragraph 4.01 of the General Conditions, and completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions within **395** days after the date when the Contract Times commence to run.

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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 $**1,000** 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 $**1,000** for each day that expires after such time until the Work is completed and ready for final payment.

4. 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 4—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, at the prices stated in Contractor's Bid, attached hereto as an exhibit.

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ARTICLE 5—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 **15th** 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. **95** percent of the value of the Work completed (with the balance being retainage).

b. **95** 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.

6.05 *Interest*

A. All amounts not paid when due will bear interest at the rate 0% percent per annum.

ARTICLE 6—CONTRACT DOCUMENTS

7.01 *Contents*

A. The Contract Documents consist of all of the following:

1. This Agreement.

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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 twenty five (25) sheets with each sheet bearing the following general title: **Sludge Handling Improvements** .
7. Addenda (numbers **[number]** to **[number]**, inclusive).
8. Exhibits to this Agreement (enumerated as follows):
    a. **[list exhibits]**
9. 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 7—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.

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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,

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(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.

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

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

Owner:	Contractor:
_____	_____
(typed or printed name of organization)	*(typed or printed name of organization)*
By: _____	By: _____
(individual's signature)	*(individual's signature)*
Date: _____	Date: _____
(date signed)	*(date signed)*
Name: _____	Name: _____
(typed or printed)	*(typed or printed)*
Title: _____	Title: _____
(typed or printed)	*(typed or printed)*
	*(If **[Type of Entity]** is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.)*
Attest: _____	Attest: _____
(individual's signature)	*(individual's signature)*
Title: _____	Title: _____
(typed or printed)	*(typed or printed)*
Address for giving notices:	Address for giving notices:
_____	_____
_____	_____
_____	_____
Designated Representative:	Designated Representative:
Name: _____	Name: _____
(typed or printed)	*(typed or printed)*
Title: _____	Title: _____
(typed or printed)	*(typed or printed)*
Address:	Address:
_____	_____
_____	_____
_____	_____
Phone: _____	Phone: _____
Email: _____	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.)*	License No.: _____
	(where applicable)
	State: _____

EJCDC® C-520, Agreement between Owner and Contractor for Construction Contract (Stipulated Price).
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PERFORMANCE BOND

Contractor	**Surety**
Name:	Name:
Address *(principal place of business)*:	Address *(principal place of business)*:
Owner	**Contract**
Name: **Town of Putnam**	Description *(name and location)*:
Mailing address *(principal place of business)*:	**Town of Putnam** **4 Kennedy Drive** **Putnam, Connecticut 06260**
200 School Street **Putnam, Connecticut 06260**	Contract Price:
	Effective Date of Contract:

Bond

Bond Amount:

Date of Bond:

(Date of Bond cannot be earlier than Effective Date of Contract)

Modifications to this Bond form:

☐ None ☐ 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
_____	_____
(Full formal name of Contractor)	*(Full formal name of Surety) (corporate seal)*
By: _____	By: _____
(Signature)	*(Signature)(Attach Power of Attorney)*
Name: _____	Name: _____
(Printed or typed)	*(Printed or typed)*
Title: _____	Title: _____
Attest: _____	Attest: _____
(Signature)	*(Signature)*
Name: _____	Name: _____
(Printed or typed)	*(Printed or typed)*
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.

EJCDC® C-610, Performance Bond.
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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, which is incorporated herein by reference.

2. 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.

3. If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond will arise after:

    3.1. 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;

    3.2. The Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and

    3.3. 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.

4. 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.

5. 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:

    5.1. Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;

    5.2. Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors;

    5.3. 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

    5.4. Waive its right to perform and complete, arrange for completion, or obtain a new contractor, and with reasonable promptness under the circumstances:

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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.

6. 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.

7. 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:

   7.1. the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;

   7.2. 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

   7.3. 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.

8. 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.

9. 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.

10. 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.

11. 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.

12. 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.

13. 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

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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.

14. Definitions

    14.1. *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.

    14.2. *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.

    14.3. *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.

    14.4. *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.

    14.5. *Contract Documents*—All the documents that comprise the agreement between the Owner and Contractor.

15. 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.

16. Modifications to this Bond are as follows: **None**

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PAYMENT BOND

Contractor	**Surety**
Name:	Name:
Address *(principal place of business)*:	Address *(principal place of business)*:
Owner	**Contract**
Name: **Town of Putnam** Mailing address *(principal place of business)*: **200 School Street** **Putnam, Connecticut 06260**	Description *(name and location)*: **Town of Putnam** **4 Kennedy Drive** **Putnam, Connecticut 06260** Contract Price: Effective Date of Contract:

Bond

Bond Amount:

Date of Bond:

(Date of Bond cannot be earlier than Effective Date of Contract)

Modifications to this Bond form:

☐ None ☐ 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
_____	_____
(Full formal name of Contractor)	*(Full formal name of Surety) (corporate seal)*
By: _____	By: _____
(Signature)	*(Signature)(Attach Power of Attorney)*
Name: _____	Name: _____
(Printed or typed)	*(Printed or typed)*
Title: _____	Title: _____
Attest: _____	Attest: _____
(Signature)	*(Signature)*
Name: _____	Name: _____
(Printed or typed)	*(Printed or typed)*
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.

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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.

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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;

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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: **None**

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NOTICE TO PROCEED

Owner:	Town of Putnam	Owner's Project No.:	
Engineer:	Fuss & O'Neill Inc.	Engineer's Project No.:	1998386.P91
Contractor:		Contractor's Project No.:	
Project:	Sludge Handling Improvements		
Contract Name:			
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:

> The number of days to achieve Substantial Completion is **[number of days, from Agreement]** from the date stated above for the commencement of the Contract Times, resulting in a date for Substantial Completion of **[date, calculated from commencement date above]**; and the number of days to achieve readiness for final payment is **[number of days, from Agreement]** from the commencement date of the Contract Times, resulting in a date for readiness for final payment of **[date, calculated from commencement date above]**.

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

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

Owner:	**Town of Putnam**
By *(signature)*:	
Name *(printed)*:	
Title:	
Date Issued:	

Copy: Engineer

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APPLICATION FOR PAYMENT

Prepared By

EJCDC®
ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

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GUIDELINES FOR THE INTENDED USE OF EJCDC C-620, APPLICATION FOR PAYMENT

1.0 PURPOSE AND INTENDED USE OF THE DOCUMENT

The Application for Payment is used to facilitate periodic progress payments to the Contractor for Work completed and for stored materials and equipment (referred to in this document as "Stored Materials").

For additional information regarding the Application for Payment, see EJCDC® C–700, Standard General Conditions of the Construction Contract (2018), Paragraph 15.01, and EJCDC® C–001, Commentary on the 2018 EJCDC Construction Documents (2018).

2.0 APPLICATION FOR PAYMENT OVERVIEW

This document was prepared in Microsoft Excel due to the number of calculations involved in the preparation of the Application for Payment. The application consists of a Summary worksheet, and 3 supporting worksheets: Lump Sum worksheet, Unit Price worksheet, and Stored Materials worksheet.

2.1 *Summary Worksheet* — calculates the amount to be paid to the Contractor at the end of each Application for Payment period. This calculation imports numbers from the supporting worksheets to determine the value of the Work completed and Stored Materials, calculate retainage, and deduct amounts previously paid to determine the amount the Contractor should be paid for the current application period. Application periods are typically one month; however these periods may be extended when Contractor's efforts do not result in the billable completion of Work or storage of materials and equipment during the payment period.

2.2 *Lump Sum Worksheet* — calculates the total value for completed Work for which compensation is paid on a Lump Sum basis. The schedule of values included in this worksheet reflects a breakdown of lump sum Work items to which Contractor and Engineer have agreed, pursuant to Article 2 of the General Conditions. Costs for Stored Materials associated with lump sum items are included on this worksheet to calculate the total value for completed lump sum Work and associated Stored Materials. This total is exported to the Summary worksheet. Separate totals for Work Completed and for materials currently stored are also exported to the Summary worksheet for use in calculating the amount of retainage to be held for each.

2.3 *Unit Price Worksheet* — calculates the total value for completed Work for which compensation is paid on a Unit Price basis. The schedule of values included in this spreadsheet is typically a tabulation of Unit Price items from the Agreement. Costs for Stored Materials associated with unit price items are included in this worksheet to calculate the total value for completed Unit Price Work and associated Stored Materials. This total is exported to the Summary worksheet. Separate totals for Work Completed and for Materials Currently Stored are also exported to the Summary worksheet for use in calculating the amount of retainage to be held for each.

2.4 *Stored Materials Worksheet* — calculates the total value for materials and equipment that have been purchased and are being stored until they are incorporated into the Work. This worksheet adds materials and equipment to the worksheet as they are brought to the site and stored; such Stored Materials are then deducted from the Stored Materials worksheet total as they are incorporated into the Work, providing a running net value for the materials and equipment remaining in storage. The values of Stored Materials must be manually added to the Lump Sum or Unit Price line items. These do not automatically update when changes are made. The amount of materials remaining in storage is eligible for payment but must be tracked separately from Work completed since different retainage rates may apply to Work completed and Stored Materials.

3.0 Instructions for filling out the Payment Application form

3.1 Project-specific information is to be entered in the top portion (header) of the Summary worksheet. This same information will automatically be copied to the other worksheets to complete the headers on all other worksheets.

3.2 Outside of the header, data can be entered in non-shaded cells when the sheet is protected. Cells shaded light blue contain equations that will automatically transfer data from other cells or make calculations to complete the worksheet. Altering any of these cells can result in errors in the Application for Payment. It is recommended that the worksheets be protected at all times unless alterations are deliberately being made to the Application for Payment form other than to enter data. See Paragraph 4.0 below for information on Protection of Worksheets.

3.3 Enter information regarding each item in the Lump Sum and/or Unit Price worksheets. For Lump Sum projects, each item should represent an item in the schedule of values prepared by the Contractor and approved by the Engineer/Owner, breaking down the Lump Sum amount into measurable components. For Unit Price contracts, use numbers from the Agreement as the schedule of values. Specific information on the data to be entered into each column may be seen by clicking on the header description for that column. Similar comments may be seen for cells in the "Totals" row that indicates how the number is calculated and where this number is exported to another part of the spreadsheet. See the Commentary for additional information.

3.4 The equations in the Summary worksheet use numbers imported from both the Lump Sum and Unit Price worksheets. Projects will typically either use the Lump Sum or the Unit Price worksheet, but some projects may use both. If one of the worksheets is not used, it should be hidden and not deleted. If it is deleted, Users will need to correct the equations in the Summary worksheet by unprotecting the worksheet and editing the equations. To hide a worksheet, right click on the worksheet tab at the bottom of the worksheet and select "Hide." To unhide a worksheet, right click on any worksheet tab and select "Unhide," and then select the worksheet to unhide and click "Okay." This same process may be used to hide these Guidelines for Use.

4.0 Protection of Worksheets

4.1 The cells in this Workbook that create the forms or contain equations have been coded to "lock" the cells that should not be altered. It is recommended that the Workbook be Protected (cells locked) at all times unless it is necessary to add or delete rows. Directions for adding and deleting rows are provided in the next section. Passwords can be used to lock the Protect / Unprotect settings on spreadsheets, however the worksheets in this workbook do not require a password.

4.2 To unprotect a worksheet, click on the "Review" menu tab at the top of Excel, then click "Unprotect Sheet." To protect a worksheet, click on the "Review" menu tab at the top of Excel, then click "Protect Sheet." This will open a dialog box in which the User is allowed to select protection options. It is recommended that only the top two checkboxes for "Select Locked Cells" and "Select Unlocked Cells" be checked. This will reset the protection for the Worksheet.

5.0 Adding and Deleting Rows

5.1 A limited number of blank rows are provided in the Lump Sum, Unit Price, and Stored Material worksheets. Additional rows may be added to these worksheets by the User. The first step in this process is to unprotect the worksheet as previously discussed. After the sheet is unprotected, move with caution to prevent inadvertently deleting any cells that contain equations. To insert a row, right click in the row heading at the left of the spreadsheet and select "Insert." A new row will be inserted at the location where the cursor was placed in the row heading. If more than one new row is desired, left click and drag the cursor to include the desired number of rows, right click in the selected row headings and then select "Insert." It is important that the line immediately above the "Totals" row not be included in the rows selected. Doing so will require that equations in the "Totals" row be adjusted. When rows are inserted, Excel automatically adjusts the equations to include the new rows, unless the row directly above the "Totals" row is also selected.

5.2 After new rows are inserted, it is important to copy a line from one of the original rows so correct formatting and equations are copied into each new row. To do this, select the row to be copied by clicking the cell in Column A and dragging the cursor to the last column in the table. Then select "Copy" from the menu or type CTRL+C to copy the cells. Excel will show that this row has been copied by showing a moving dashed line around the cells that are to be copied. Then select the new rows into which the information is to be copied as before and select Paste from the menu or type CTRL+V.

5.3 To delete an unused row, right click in the row heading on the left of the spreadsheet for the row to be deleted and select "Delete." The selected row will be deleted. If more than one row is to be deleted, left click and drag the cursor to the desired number of rows to be deleted and then right click to open the menu and select "Delete." Unlike the admonition on adding new rows, it is okay to delete the row just above the "Totals" row.

5.4 After rows have been added or deleted, it is important reset the worksheet protection.

6.0 Saving Files

This file is provided as a Microsoft ® Excel Open XML workbook template (.xltx) to prevent this file from being inadvertently changed. When an application for payment is created for a specific project it should be saved as an Excel workbook (.xlxs) file. To do this, select Save As (F12), type in a new file name and select Excel Workbook (.xlxs) from the drop down Save As Type menu.

7.0 License Agreement

This document is subject to the terms and conditions of the License Agreement, 2018 EJCDC® Construction Series Documents. A copy of the License Agreement was furnished at the time of purchase of this document, and is available for review at www.ejcdc.org and the websites of EJCDC's sponsoring organizations.

Contractor's Application for Payment

Owner:		**Owner's Project No.:**	
Engineer:		**Engineer's Project No.:**	
Contractor:		**Contractor's Project No.:**	
Project:			
Contract:			
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:** _____

Recommended by Engineer		**Approved by Owner**	
By:		**By:**	
Title:		**Title:**	
Date:		**Date:**	
Approved by Funding Agency			
By:		**By:**	
Title:		**Title:**	
Date:		**Date:**	

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Progress Estimate - Lump Sum Work **Contractor's Application for Payment**

Owner: ____________________ **Owner's Project No.:** __________
Engineer: ____________________ **Engineer's Project No.:** __________
Contractor: ____________________ **Contractor's Project No.:** __________
Project: ____________________
Contract: ____________________

Application No.: __________ **Application Period:** **From** __________ **to** __________ **Application Date:** __________

A	B	C	D	E	F	G	H	I
			Work Completed					
Item No.	Description	Scheduled Value ($)	(D + E) From Previous Application ($)	This Period ($)	Materials Currently Stored (not in D or E) ($)	Work Completed and Materials Stored to Date (D + E + F) ($)	% of Scheduled Value (G / C) (%)	Balance to Finish (C - G) ($)
			Original Contract					
			-			-		-
						-		-
						-		-
						-		-
						-		-
						-		-
						-		-
						-		-
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						-		-
						-		-
						-		-
						-		-
						-		-
						-		-
						-		-
	Original Contract Totals	$ -	$ -	$ -	$ -	$ -		$ -

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Progress Estimate - Lump Sum Work

Contractor's Application for Payment

Owner: ______________________ **Owner's Project No.:** ____________

Engineer: ______________________ **Engineer's Project No.:** ____________

Contractor: ______________________ **Contractor's Project No.:** ____________

Project: ______________________

Contract: ______________________

Application No.: ____________ **Application Period:** **From** ____________ **to** ____________ **Application Date:** ____________

A	B	C	D	E	F	G	H	I
			Work Completed					
Item No.	Description	Scheduled Value ($)	(D + E) From Previous Application ($)	This Period ($)	Materials Currently Stored (not in D or E) ($)	Work Completed and Materials Stored to Date (D + E + F) ($)	% of Scheduled Value (G / C) (%)	Balance to Finish (C - G) ($)
			Change Orders					
						-		-
						-		-
						-		-
						-		-
						-		-
						-		-
						-		-
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						-		-
	Change Order Totals	$ -	$ -	$ -	$ -	$ -		$ -
			Original Contract and Change Orders					
	Project Totals	$ -	$ -	$ -	$ -	$ -		$ -

Progress Estimate - Unit Price Work

Contractor's Application for Payment

Owner:
Engineer:
Contractor:
Project:
Contract:

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

Application No.: **Application Period:** From to **Application Date:**

A	B	C	D	E	F	G	H	I	J	K	L
		Contract Information				Work Completed					
Bid Item No.	Description	Item Quantity	Units	Unit Price ($)	Value of Bid Item (C X E) ($)	Estimated Quantity Incorporated in the Work	Value of Work Completed to Date (E X G) ($)	Materials Currently Stored (not in G) ($)	Work Completed and Materials Stored to Date (H + I) ($)	% of Value of Item (J / F) (%)	Balance to Finish (F - J) ($)
Original Contract											
					-		-		-		-
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					-		-		-		-
					-		-		-		-
				Original Contract Totals	$ -		$ -	$ -	$ -		$ -

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Progress Estimate - Unit Price Work

Contractor's Application for Payment

Owner: ____________________

Engineer: ____________________

Contractor: ____________________

Project: ____________________

Contract: ____________________

Owner's Project No.: ____________

Engineer's Project No.: ____________

Contractor's Project No.: ____________

Application No.: ____________ **Application Period:** From ____________ to ____________ **Application Date:** ____________

A	B	C	D	E	F	G	H	I	J	K	L
		Contract Information				Work Completed					
Bid Item No.	Description	Item Quantity	Units	Unit Price ($)	Value of Bid Item (C X E) ($)	Estimated Quantity Incorporated in the Work	Value of Work Completed to Date (E X G) ($)	Materials Currently Stored (not in G) ($)	Work Completed and Materials Stored to Date (H + I) ($)	% of Value of Item (J / F) (%)	Balance to Finish (F - J) ($)
Change Orders											
					-		-		-		-
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Change Order Totals					$ -		$ -	$ -	$ -		$ -
Original Contract and Change Orders											
Project Totals					$ -		$ -	$ -	$ -		$ -

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Stored Materials Summary

Contractor's Application for Payment

Owner: _____
Engineer: _____
Contractor: _____
Project: _____
Contract: _____

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

Application No.: _____ Application Period: From _____ to _____ Application Date: _____

A	B	C	D	E	F	G	H	I	J	K	L	M
						Materials Stored			Incorporated in Work			
Item No. (Lump Sum Tab) or Bid Item No. (Unit Price Tab)	Supplier Invoice No.	Submittal No. (with Specification Section No.)	Description of Materials or Equipment Stored	Storage Location	Application No. When Materials Placed in Storage	Previous Amount Stored ($)	Amount Stored this Period ($)	Amount Stored to Date (G+H) ($)	Amount Previously Incorporated in the Work ($)	Amount Incorporated in the Work this Period ($)	Total Amount Incorporated in the Work (J+K) ($)	Materials Remaining in Storage (I-L) ($)
								-			-	-
								-			-	-
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					Totals	$ -	$ -	$ -	$ -	$ -	$ -	$ -

EJCDC C-620 Contractor's Application for Payment
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CERTIFICATE OF SUBSTANTIAL COMPLETION

Owner:	Town of Putnam	Owner's Project No.:	
Engineer:	Fuss & O'Neill	Engineer's Project No.:	1998386P91
Contractor:		Contractor's Project No.:	
Project:	Sludge Handling Improvements		
Contract Name:			

This ☐ Preliminary ☐ Final Certificate of Substantial Completion applies to:

☐ All Work ☐ The following specified portions of the Work:

[Describe the portion of the work for which Certificate of Substantial Completion is issued]

Date of Substantial Completion: **[Enter date, as determined by Engineer]**

The Work to which this Certificate applies has been inspected by authorized representatives of Owner, Contractor, and Engineer, and found to be substantially complete. The Date of Substantial Completion of the Work or portion thereof designated above is hereby established, subject to the provisions of the Contract pertaining to Substantial Completion. The date of Substantial Completion in the final Certificate of Substantial Completion marks the commencement of the contractual correction period and applicable warranties required by the Contract.

A punch list of items to be completed or corrected is attached to this Certificate. This list may not be all-inclusive, and the failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

Amendments of contractual responsibilities recorded in this Certificate should be the product of mutual agreement of Owner and Contractor; see Paragraph 15.03.D of the General Conditions.

The responsibilities between Owner and Contractor for security, operation, safety, maintenance, heat, utilities, insurance, and warranties upon Owner's use or occupancy of the Work must be as provided in the Contract, except as amended as follows:

Amendments to Owner's Responsibilities: ☐ None ☐ As follows:

[List amendments to Owner's Responsibilities]

Amendments to Contractor's Responsibilities: ☐ None ☐ As follows:

[List amendments to Contractor's Responsibilities]

The following documents are attached to and made a part of this Certificate:

[List attachments such as punch list; other documents]

This Certificate does not constitute an acceptance of Work not in accordance with the Contract Documents, nor is it a release of Contractor's obligation to complete the Work in accordance with the Contract Documents.

Engineer

By *(signature)*: _____

Name *(printed)*: _____

Title: _____

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NOTICE OF ACCEPTABILITY OF WORK

Owner:	Town of Putnam	Owner's Project No.:	
Engineer:	Fuss & O'Neill	Engineer's Project No.:	1998386P91
Contractor:		Contractor's Project No.:	
Project:	Sludge Improvements Project		
Contract Name:			
Notice Date:		Effective Date of the Construction Contract:	

The Engineer hereby gives notice to the Owner and Contractor that Engineer recommends final payment to Contractor, and that the Work furnished and performed by Contractor under the Construction Contract is acceptable, expressly subject to the provisions of the Construction Contract's Contract Documents ("Contract Documents") and of the Agreement between Owner and Engineer for Professional Services dated **[date of professional services agreement]** ("Owner-Engineer Agreement"). This Notice of Acceptability of Work (Notice) is made expressly subject to the following terms and conditions to which all who receive and rely on said Notice agree:

1. This Notice has been prepared with the skill and care ordinarily used by members of the engineering profession practicing under similar conditions at the same time and in the same locality.
2. This Notice reflects and is an expression of the Engineer's professional opinion.
3. This Notice has been prepared to the best of Engineer's knowledge, information, and belief as of the Notice Date.
4. This Notice is based entirely on and expressly limited by the scope of services Engineer has been employed by Owner to perform or furnish during construction of the Project (including observation of the Contractor's Work) under the Owner-Engineer Agreement, and applies only to facts that are within Engineer's knowledge or could reasonably have been ascertained by Engineer as a result of carrying out the responsibilities specifically assigned to Engineer under such Owner-Engineer Agreement.
5. This Notice is not a guarantee or warranty of Contractor's performance under the Construction Contract, an acceptance of Work that is not in accordance with the Contract Documents, including but not limited to defective Work discovered after final inspection, nor an assumption of responsibility for any failure of Contractor to furnish and perform the Work thereunder in accordance with the Contract Documents, or to otherwise comply with the Contract Documents or the terms of any special guarantees specified therein.
6. This Notice does not relieve Contractor of any surviving obligations under the Construction Contract, and is subject to Owner's reservations of rights with respect to completion and final payment.

Engineer

By *(signature)*: _____

Name *(printed)*: _____

Title: _____

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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

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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

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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.

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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.

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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.

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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.

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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

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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.

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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

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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.

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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

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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.

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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.

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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

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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.

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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

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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;

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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

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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

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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

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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

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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

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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.

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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);

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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

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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.

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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.

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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;

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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.

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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.

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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.

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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.

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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.

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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.

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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.

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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

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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.

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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

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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.

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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.

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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.

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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.

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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.

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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.

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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.

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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.

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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:

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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.

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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

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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

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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

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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

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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.

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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, expediters, 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

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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

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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.

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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,

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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,

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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

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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.

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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;

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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

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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

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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.

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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,

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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.

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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,

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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

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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.

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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.

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This document has important legal consequences; consultation with an attorney is encouraged with respect to its use or modification. This document should be adapted to the particular circumstances of the contemplated Project and the controlling Laws and Regulations.

SUPPLEMENTARY CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared By

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ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

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GUIDELINES FOR USE OF EJCDC® C-800, SUPPLEMENTARY CONDITIONS OF THE CONSTRUCTION CONTRACT

1.0 PURPOSE AND INTENDED USE OF THE DOCUMENT

1.1 *General*

The Engineers Joint Contract Documents Committee® (EJCDC®) has prepared and publishes standard contract forms for construction contracts, as well as bidding-related documents. The principal forms are listed in Table 1. EJCDC has also prepared other documents that may be useful in preparing construction contract documents. Some of the principal ones are listed in Table 2. For the most recent editions of these forms, guides, and other documents, please refer to EJCDC's website at www.ejcdc.org.

Table 1—Principal EJCDC Standard Forms for Construction Contracts

Name	Number	Short Title/Abbreviation
Instructions to Bidders for Construction Contract	C-200	Instructions/I
Bid Form for Construction Contract	C-410	Bid Form/BF
Agreement between Owner and Contractor for Construction Contract (Stipulated Price)	C-520	Stipulated Price Agreement/A
Agreement between Owner and Contractor for Construction Contract (Cost-Plus-Fee)	C-525	Cost-Plus Agreement/A
Standard General Conditions of the Construction Contract	C-700	General Conditions/GC
Supplementary Conditions of the Construction Contract	C-800	Supplementary Conditions/SC

Table 2—Principal EJCDC Documents Relating to Preparation of Construction Documents

Name	Number	Short Title
Commentary on the 2018 EJCDC Construction Documents	C-001	Commentary
Uniform Location of Subject Matter	N-122	Locator Guide
Bidding Procedures and Construction Contract Documents	C-050	Bidding Procedures
Engineer's Letter to Owner Requesting Instructions Concerning Bonds and Insurance	C-051	Engineer's Letter to Owner Concerning Bonds and Insurance
Owner's Instructions to Engineer Concerning Bonds and Insurance	C-052	Owner's Instructions Concerning Bonds and Insurance

1.2 *Mandatory Supplementary Conditions*

A. Several provisions of the General Conditions expressly indicate that essential Project-specific information will be set out in a corresponding Supplementary Condition. For example, Paragraph 6.03.A of the General Conditions indicates that the specific requirements for insurance to be carried by Contractor will be stated in the Supplementary Conditions. Every EJCDC based construction contract should include, at a minimum, the following Supplementary Conditions, edited for the specific project:

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1. Paragraph SC-5.03, concerning reports and drawings of conditions at the Site that contain Technical Data on whose accuracy the Contractor may rely;

2. Paragraph SC-5.06, disclosing reports and drawings regarding Hazardous Environmental Conditions at the Site, and identifying any Technical Data in those reports and drawings on whose accuracy the Contractor may rely;

3. Paragraph SC-6.03, identifying specific insurance coverage requirements; and

4. One of the two alternatives presented in SC-10.03 (either the Engineer will provide Resident Project Representative services on the Project, with specific authority and responsibilities, or Engineer will not provide Resident Project Representative services).

B. Other suggested Supplementary Conditions are mandatory under specific circumstances: for example, on projects in which the Contractor will be responsible for compliance with Owner's safety program, SC-7.13 would be mandatory.

C. In describing a Supplementary Condition as "mandatory" EJCDC is indicating that it is essential to furnish the information that is the subject of the Supplementary Condition; however, the drafter is not restricted from modifying the wording and content of the proposed Supplementary Condition as needed.

1.3 *Relationship of Supplementary Conditions to Other Contract Documents*

Supplementary Conditions are modifications to the General Conditions—additions, deletions, changes. This is as the term is defined by EJCDC and the Construction Specification Institute (CSI). Other organizations use their supplementary conditions to modify a broader range of contract documents, such as agreement forms and standard specifications.

This Guide and the other Construction-related documents prepared and issued by EJCDC assume use of the CSI MasterFormat™ concept, which provides an organizational format for location of all documentary information for a construction project: Bidding Requirements, contract forms (Agreement, Bonds, and certificates), General Conditions, Supplementary Conditions, and Specifications. Under the CSI MasterFormat™, the last grouping, Specifications, is divided into 49 Divisions, the first of which, Division 01, is entitled "General Requirements."

The standard fundamental provisions affecting the rights and duties of the parties appear in the General Conditions. Language to modify the fundamental relationships between the parties, supplement the framework set forth in the General Conditions, or change the language of the General Conditions, should appear in the Supplementary Conditions. Examples of this are a change in Contractor's Site responsibilities, and a supplemental clause specifying the details of insurance coverages and limits for the Project.

Price terms, monetary terms such as liquidated damages clauses, and completion dates should all be set forth in the Agreement (C-520–Stipulated Sum, or C-525–Cost-Plus-Fee), and should not be included in the Supplementary Conditions.

1.4 *Arrangement of Subject Matter*

This Supplementary Conditions document is arranged in the same order as the 2018 edition of the General Conditions, and the proposed Supplementary Conditions Paragraphs bear comparable addresses to those of the General Conditions. A discussion of the purpose and function of these suggested Supplementary Conditions is included in EJCDC® C-001, Commentary on the 2018 EJCDC Construction Documents (2018).

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1.5 *Use of this Document*

The text in this document is suggested contract language for some commonly used Supplementary Conditions. Most of the suggested Supplementary Conditions are accompanied by Guidance Notes that discuss the purpose or usage of the Supplementary Condition. These Guidance Notes are often just the first step in determining whether to use the Supplementary Condition, and if so whether revisions are needed to suit the specific project. The drafter should bear in mind that most contractual provisions have important legal consequences. Consultation with legal counsel before finalization of any amendment or supplement is recommended.

There may be notes, prompts, or "fill in the blanks" within the text of a suggested Supplementary Condition. These should be read and followed, then removed when the document is finalized. See Paragraph 4.0, Finalizing a Specific Project's Supplementary Conditions, below.

Many sets of supplementary conditions examined by EJCDC contain typical or "boilerplate" provisions that have accumulated like moss over the years, appear to have no practical significance for the particular project, and may produce unintended and surprising legal consequences. Such provisions are usually there because someone saw similar terms in other contract documents and it "sounded good." Selecting contract terms in that manner is not recommended. Provisions of the Supplementary Conditions should address a particular point in the General Conditions or cover a particular topic. The Supplementary Conditions should not be a repository for general language of vague meaning for which another location cannot be readily found.

This Supplementary Conditions document assumes a general familiarity with the other Construction Series (C-Series) documents prepared by EJCDC and, when drafting language, specific attention to them is encouraged. Standard documents or prescribed forms issued by governmental bodies and other owners may differ materially from the documents of EJCDC so that careful correlation of any amending or supplementing language is essential. The practice of stating that any provision in one document that is inconsistent with another is superseded, or that one document always takes precedence over another in the event of a conflict in language or requirements, is sometimes necessary, but generally discouraged. The resulting legal consequences of such provisions are frequently difficult to decipher and may be very different from what was anticipated.

The EJCDC General Conditions use carefully chosen language and set forth the basic responsibilities of the parties with respect to fundamental matters and legal consequences. Their provisions should be altered only where mandated by the specific requirements of a given project and the consequences of any modification are thoroughly understood.

Caution should be exercised when making any change in the standard documents. They have been carefully prepared, terms are used uniformly throughout and are consistent with the terms in other EJCDC documents. Their provisions have been carefully integrated, and are dependent on one another. A change in one document may necessitate a change in another, and a change in one paragraph may necessitate a change in other language of the same document. No change should be made until its full effect on the rest of the General Conditions and other Contract Documents has been considered.

Lastly, remember that an engineer is neither qualified nor licensed to give advice to others on the legal consequences of contracts. All of the Contract Documents have important legal consequences. Similarly, many portions of the documents involve insurance, bonding, and other

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subjects that are outside the scope of an engineer's services. Owners are encouraged to seek the advice of an attorney (and risk managers, insurance consultants, and other specialists) before accepting any modification of the published forms, before the documents are sent out for bidding, and most assuredly before signing any agreement.

2.0 STANDARD PREFATORY LANGUAGE AND TRADITIONAL FORMAT FOR SUPPLEMENTARY CONDITIONS

Suggested format and wording conventions for Supplementary Conditions appear below.

2.1 *Table of Contents*

The inclusion of a table of contents will benefit the user of the Supplementary Conditions, especially if additional articles (beyond the 18 Articles of the General Conditions) are added.

2.2 *Pagination*

If CSI's MasterFormat™ is being used for the Contract Documents, consult MasterFormat™ for the appropriate section number and number the pages accordingly.

2.3 *Format for Complete Paragraph Change*

When completely superseding a paragraph of the General Conditions, the following example language may be used:

"SC-5.09 Delete Paragraph 5.09.B in its entirety and insert the following in its place:

[Text to be inserted]"

2.4 *Format for Change within a Paragraph*

When changing language within a paragraph of the General Conditions, the following example language may be used:

"SC-6.21 Amend the second sentence of Paragraph 6.21.A **[to read as follows] [by striking out the following words]**:

[Text to be modified]"

2.5 *Format for Additional Language*

When adding language to an existing paragraph of the General Conditions, the idea may be expressed as in the following example:

"SC-9.03 Add the following language at the end of the second sentence of Paragraph 9.03:

[Text to be added]"

2.6 *Format for Additional Paragraph*

If it is desired to add a new paragraph to the General Conditions, the thought may be expressed as in the following example:

"SC-8.06 Add the following new paragraph immediately after Paragraph 8.06.B:

C. [Paragraph text to be added]"

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3.0 ALTERNATIVE FORMAT FOR SUPPLEMENTARY CONDITIONS

Electronic files are commonly used for transmittal and storage of the text of standard documents. In fact, EJCDC no longer publishes printed documents. Because it is easy to modify documents electronically, it is increasingly common for practitioners to integrate the text of desired Supplementary Conditions into the text of the General Conditions. Most word processing programs have line-out and underlining features that accurately show deletions, changes, and additions. Users of EJCDC's General Conditions are contractually obligated, through the terms of the purchase of the document, to clearly delineate all changes made to the standard text of the General Conditions to other parties in interest (for example, if Owner makes changes, Owner should show these changes to prospective bidders). It would be misleading to users (and a violation of the License Agreement) to imply or represent that the General Conditions are EJCDC's General Conditions if changes are not properly and clearly identified during the contract formation process.

4.0 FINALIZING A SPECIFIC PROJECT'S SUPPLEMENTARY CONDITIONS

4.1 *Key Steps*

A. Review Paragraphs 1.0, 2.0, and 3.0 above, especially Paragraph 1.5, Use of this Document.

B. Read the Guidance Notes that accompany the proposed Supplementary Conditions.

C. Retain those Supplementary Conditions that are applicable to the specific Project; revise the standard wording as needed; supply required information such as insurance policy limits.

D. Delete all proposed Supplementary Conditions that do not apply to the Project and delete Paragraphs 1.0 through 3.0 and all Guidance Notes.

E. Add any additional Supplementary Conditions specific to the Project.

F. Check cross-references back to the General Conditions.

G. Delete this Paragraph 4.0 after confirming that Paragraphs 1.0, 2.0 and 3.0, all Guidance Notes, and all other notes have been removed.

H. Remove the cover pages (title pages).

I. Update or delete the Table of Contents.

4.2 *Editing the Supplementary Conditions Text*

A. Type in required information as indicated by brackets (**[ ]**). Bracketed text will usually provide instructions for what is to be inserted in place of the brackets. Delete the brackets and change formatting to match surrounding text after the project specific text has been added, e.g. change "**[Project Name]**" to "Peach Street Renovation" (without brackets or bold, or quotation marks).

B. Fill in blanks, if any (more commonly information to be inserted by user will be indicated by a prompt in brackets, as described in Paragraph A above, rather than by an underline-style blank).

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C. Some Notes to Users are interspersed in the text, usually within brackets. Delete all "Notes to User" after reviewing each note and taking appropriate action. Delete all associated numbering and brackets.

D. Fill in all tables.

5.0 ORGANIZATION OF INFORMATION

All parties involved in a construction project benefit significantly from a standardized approach in the location of subject matter throughout the documents. Experience confirms the danger of addressing the same subject matter in more than one location; doing so frequently leads to confusion and unanticipated legal consequences. Careful attention should be given to the guidance provided in EJCDC® N-122/AIA® A521, Uniform Location of Subject Matter (2012 Edition) when preparing documents. EJCDC® N-122/AIA® A521 is available at no charge from the EJCDC website, www.ejcdc.org, and from the websites of EJCDC's sponsoring organizations.

If CSI MasterFormat™ is used for organizing the Project Manual, consult CSI MasterFormat™ for the appropriate document number (e.g., under 00 11 00, Advertisements and Invitations), and accordingly number the document and its pages.

6.0 GUIDANCE NOTES AND NOTES TO USER

EJCDC Documents include Guidance Notes and Notes to User to provide assistance in the preparation of Project-specific documents. These notes are intended for use by the user in the preparation of the document and are not intended to be included in the completed document. Guidance Notes and Notes to User are lightly shaded to distinguish them from the proposed text of the Instructions themselves. As project-specific Instructions to Bidders are prepared and made ready for issuance to bidders, all shaded text (Guidance Notes and Notes to Users) should be deleted.

A Guidance Note provides information regarding the suggested Supplementary Condition that follows, including reasons for the suggested SC, discussions of best practices, and alternate approaches for different situations.

Notes to User provide specific information for editing the text of a suggested Supplementary Condition. When alternate wording is presented, explanations on how to select the most appropriate alternate will be provided, with direction to delete the wording not used.

7.0 LICENSE AGREEMENT

This document is subject to the terms and conditions of the **License Agreement, 2018 EJCDC® Construction Series Documents**. A copy of the License Agreement was furnished at the time of purchase of this document, and is available for review at www.ejcdc.org and the websites of EJCDC's sponsoring organizations.

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SUPPLEMENTARY CONDITIONS OF THE CONSTRUCTION CONTRACT

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SUPPLEMENTARY CONDITIONS OF THE CONSTRUCTION CONTRACT

Guidance Note—Introductory Statement—The following is a suggestion for use at the beginning of the Supplementary Conditions for a specific project:

These Supplementary Conditions amend or supplement EJCDC® C-700, Standard General Conditions of the Construction Contract (2018). The General Conditions remain in full force and effect except as amended.

The terms used in these Supplementary Conditions have the meanings stated in the General Conditions. Additional terms used in these Supplementary Conditions have the meanings stated below, which are applicable to both the singular and plural thereof.

The address system used in these Supplementary Conditions is the same as the address system used in the General Conditions, with the prefix "SC" added—for example, “Paragraph SC-4.05.”

ARTICLE 1—DEFINITIONS AND TERMINOLOGY

No suggested Supplementary Conditions in this Article.

ARTICLE 2—PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

Guidance Notes—Furnishing Copies of Insurance Policies— Paragraph 2.01.B of the General Conditions requires that Contractor furnish certificates of insurance and copies of endorsements. Paragraph 6.02.D states that upon request by Owner or other additional insureds, Contractor must provide evidence of insurance such as copies of required policies, and documentation of applicable self-insured retentions and deductibles, such as a copy of the portion of the insurance policy establishing the retention or deductible amount. Parallel provisions (GC-2.01.C; GC-6.02.E) apply to Owner and the insurance that Owner is required to provide. Rather than relying on this two-step process (delivery of certificates of insurance and endorsements at the outset; subsequent requests for additional evidence of insurance), some contract drafters may elect to require from the outset that copies of the insurance policies, rather than certificates of insurance, be delivered to the other party. If exchange of copies of insurance policies is required, the following should be used:

SC-2.01 Delete Paragraphs 2.01.B. and C. in their entirety and insert the following in their place:

B. *Evidence of Contractor’s Insurance:* When Contractor delivers the signed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner copies of the policies (including all endorsements, and identification of applicable self-insured retentions and deductibles) of insurance required to be provided by Contractor in this Contract. Contractor may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.

C. *Evidence of Owner’s Insurance:* After receipt from Contractor of the signed counterparts of the Agreement and all required bonds and insurance documentation, Owner shall promptly deliver to Contractor copies of the policies of insurance to be provided by Owner in this

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Contract (if any). Owner may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.

2.02 *Copies of Documents*

Guidance Notes—Furnishing Contract Documents to Contractor—GC-2.02.A indicates that Owner will furnish four printed (hard) copies of the Contract Documents, and one PDF copy.

If Owner is not furnishing PDF or other electronic files of the Contract Documents, then (1) revise GC-2.02.A to indicate that Owner is not providing the PDF files, and (2) include a Supplementary Condition that deletes Paragraph 3.01.C in its entirety (see SC-3.01 below). SC-2.02 below is used to accomplish item (1), and may also be used to change the number of printed copies of the Contract Documents to be provided, if the number is not four.

SC-2.02 Amend the first sentence of Paragraph 2.02.A. to read as follows:

Owner shall furnish to Contractor **[number]** printed copies of the Contract Documents (including one fully signed counterpart of the Agreement), and **[one copy] [none]** in electronic portable document format (PDF).

Guidance Notes—Conformed Contract Documents—On some projects it may be useful to produce conformed Contract Documents, in which the content of Addenda and negotiated changes are merged into the appropriate Specifications, Drawings, General Conditions, and other Contract Documents. This may be especially true on private construction projects where the terms and scope are negotiated and modified significantly after the initial release of proposed Contract Documents. Conformed documents may be considerably more convenient to use during the performance of the Work and the administration of the Contract.

EJCDC advises that if conformed documents are to be prepared and made available to Contractor, sufficient time and budget must be allocated to ensure the quality and full coordination of the conformed documents, and Owner and Engineer must recognize that Contractor, Subcontractors, and Suppliers will likely rely on the conformed version of the Contract Documents rather than the source components. If conformed documents are prepared without the level of commitment necessary to allow them to be accorded the full status of "Contract Documents," and are merely for reference or convenience, they should be accompanied by clear disclaimers of their content and a warning to consult the actual source Contract Documents.

A Supplementary Condition regarding conformed documents is necessary only if the Owner intends to provide the Contractor with conformed documents that will serve as binding Contract Documents. The following may be used for that purpose:

SC-2.02 Delete Paragraph 2.02.A in its entirety and insert the following new paragraph in its place:

A. Owner shall furnish to Contractor **[number]** printed copies of conformed Contract Documents incorporating and integrating all Addenda and any amendments negotiated prior to the Effective Date of the Contract (including one fully signed counterpart of the Agreement), and one copy in electronic portable document format (PDF). Additional printed copies of the conformed Contract Documents will be furnished upon request at the cost of reproduction.

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2.06 *Electronic Transmittals*

Guidance Notes—Electronic Documents Protocol (EDP)—GC-2.06.A authorizes the electronic transmittal of Electronic Documents (commencing with the 2018 edition of the C-Series, Electronic Documents is a defined term in the General Conditions), and GC-2.06.B indicates that if the Contract does not establish protocols for such transmittals, then Owner, Engineer, and Contractor will jointly develop such protocols. The following Supplementary Conditions may be used to contractually establish transmittal protocols, eliminating the need for joint development after the Contract is underway.

The Supplementary Conditions establishing the Electronic Documents Protocol ("EDP" or "Protocol") define the relationships between the parties relative to responsibilities and limitations governing use of Electronic Documents on the Project. The drafter of the Protocol, with assistance of Owner and Engineer, will need to customize for Project-specific management, system, data, and technical needs.

Software and data formats for exchange of Electronic Documents will vary depending on the preferences of the Owner and the needs of the Project. A sample set of basic software and data formats, commonly seen for exchanging information on many horizontal construction projects, has been included in Exhibit A, Software Requirements for Electronic Document Exchange, as a starting point for Project information exchange standards. **[Exhibit A is located at the end of C-800, with other exhibits.]** No representation is made that these standards will be applicable to any particular project, and each user must review and modify Exhibit A as needed.

The Protocol addresses the limited data exchange functions intended by the basic software and data formats described in Exhibit A, but the Protocol does not directly address the exchange of "native" design files between the parties for more robust uses beyond such data exchange, nor does it address special issues associated with use of "native" design files, not the least of which is suitability for uses not necessarily intended or anticipated by the file author. While nothing precludes the exchange of "native" files under this Protocol, it is up to the Parties to define how such "native" files may be used and modify the Protocol for criteria of use and any limitations to such use.

Many entities have developed their own data organization standards for "native" files, including such criteria as data model element organization, drawing layer conventions, Building Information Modeling (BIM) and Civil Integrated Management Model protocols, Geographic Information System schema, and integrated and cross-referenced data sets. Additionally, several institutions and design/construction industry organizations have developed and published more comprehensive technical criteria, schemas and plans for use as guides to data organization standards.

Here again, where the data standards require a broader and, generally more collaborative, review and definition of the obligations of the parties, it is up to the parties to significantly modify this Protocol considering such matters as: 1) party responsible for managing models or system; 2) maintaining integrity of the models or system; 3) ownership of the model or system; 4) enhanced system infrastructure, software, access and security standards; 5) responsibility and liability of respective parties in the role of adding or using elements of common models; 6) additional protocols for quality control and quality assurance; and many other factors.

Some projects feature a Project Website as a part of the EDP. The EDP below includes a clause that may be used to set standards for such a website:

1. *Project Website Established by Owner:* If Owner, either directly or through the Engineer or a third party, elects to establish and operate a Project Website or other electronic information management system during the Project, with or without the project document archive described in SC-2.06.B.2.e,

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then include and modify Paragraph SC-2.06.B.2.h as appropriate to set forth any standards applicable to use of the website.

2. *Project Website Established by Contractor:* Under the less common condition in which the operation of the Project Website is delegated by Owner to the Contractor, Paragraph SC-2.06.B.2.h will need to be modified significantly and include the method of compensation, if any, to be paid to Contractor for Project Website services.

To include an Electronic Documents Protocol (EDP), use the following Supplementary Condition:

SC-2.06 Delete Paragraphs 2.06.B and 2.06.C in their entirety and insert the following in their place:

B. *Electronic Documents Protocol:* The parties shall conform to the following provisions in Paragraphs 2.06.B and 2.06.C, together referred to as the Electronic Documents Protocol ("EDP" or "Protocol") for exchange of electronic transmittals.

1. *Basic Requirements*

a. To the fullest extent practical, the parties agree to and will transmit and accept Electronic Documents in an electronic or digital format using the procedures described in this Protocol. Use of the Electronic Documents and any information contained therein is subject to the requirements of this Protocol and other provisions of the Contract.

b. The contents of the information in any Electronic Document will be the responsibility of the transmitting party.

c. Electronic Documents as exchanged by this Protocol may be used in the same manner as the printed versions of the same documents that are exchanged using non-electronic format and methods, subject to the same governing requirements, limitations, and restrictions, set forth in the Contract Documents.

d. Except as otherwise explicitly stated herein, the terms of this Protocol will be incorporated into any other agreement or subcontract between a party and any third party for any portion of the Work on the Project, or any Project-related services, where that third party is, either directly or indirectly, required to exchange Electronic Documents with a party or with Engineer. Nothing herein will modify the requirements of the Contract regarding communications between and among the parties and their subcontractors and consultants.

e. When transmitting Electronic Documents, the transmitting party makes no representations as to long term compatibility, usability, or readability of the items resulting from the receiving party's use of software application packages, operating systems, or computer hardware differing from those established in this Protocol.

f. Nothing herein negates any obligation 1) in the Contract to create, provide, or maintain an original printed record version of Drawings and Specifications, signed and sealed according to applicable Laws and Regulations; 2) to comply with any applicable Law or Regulation governing the signing and sealing of design documents or the signing and electronic transmission of any other documents; or 3) to comply with the notice requirements of Paragraph 18.01 of the General Conditions.

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2. *System Infrastructure for Electronic Document Exchange*

   a. Each party will provide hardware, operating system(s) software, internet, e-mail, and large file transfer functions ("System Infrastructure") at its own cost and sufficient for complying with the EDP requirements. With the exception of minimum standards set forth in this EDP, and any explicit system requirements specified by attachment to this EDP, it is the obligation of each party to determine, for itself, its own System Infrastructure.

      1) The maximum size of an email attachment for exchange of Electronic Documents under this EDP is **[number]** MB. Attachments larger than that may be exchanged using large file transfer functions or physical media.

      2) Each Party assumes full and complete responsibility for any and all of its own costs, delays, deficiencies, and errors associated with converting, translating, updating, verifying, licensing, or otherwise enabling its System Infrastructure, including operating systems and software, for use with respect to this EDP.

   b. Each party is responsible for its own system operations, security, back-up, archiving, audits, printing resources, and other Information Technology ("IT") for maintaining operations of its System Infrastructure during the Project, including coordination with the party's individual(s) or entity responsible for managing its System Infrastructure and capable of addressing routine communications and other IT issues affecting the exchange of Electronic Documents.

   c. Each party will operate and maintain industry-standard, industry-accepted, ISO-standard, commercial-grade security software and systems that are intended to protect the other party from: software viruses and other malicious software like worms, trojans, adware; data breaches; loss of confidentiality; and other threats in the transmission to or storage of information from the other parties, including transmission of Electronic Documents by physical media such as CD/DVD/flash drive/hard drive. To the extent that a party maintains and operates such security software and systems, it shall not be liable to the other party for any breach of system security.

   d. In the case of disputes, conflicts, or modifications to the EDP required to address issues affecting System Infrastructure, the parties shall cooperatively resolve the issues; but, failing resolution, the Owner is authorized to make and require reasonable and necessary changes to the EDP to effectuate its original intent. If the changes cause additional cost or time to Contractor, not reasonably anticipated under the original EDP, Contractor may seek an adjustment in price or time under the appropriate process in the Contract.

   e. Each party is responsible for its own back-up and archive of documents sent and received during the term of the contract under this EDP, unless this EDP establishes a Project document archive, either as part of a mandatory Project website or other communications protocol, upon which the parties may rely for document archiving during the specified term of operation of such Project document archive. Further, each party remains solely responsible for its own post-Project back-up and archive of Project documents after the term of the Contract, or after termination of the

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Project document archive, if one is established, for as long as required by the Contract and as each party deems necessary for its own purposes.

f. If a receiving party receives an obviously corrupted, damaged, or unreadable Electronic Document, the receiving party will advise the sending party of the incomplete transmission.

g. The parties will bring any non-conforming Electronic Documents into compliance with the EDP. The parties will attempt to complete a successful transmission of the Electronic Document or use an alternative delivery method to complete the communication.

h. The Owner will operate a Project information management system (also referred to in this EDP as "Project Website") for use of Owner, Engineer and Contractor during the Project for exchange and storage of Project-related communications and information. Except as otherwise provided in this EDP or the General Conditions, use of the Project Website by the parties as described in this Paragraph will be mandatory for exchange of Project documents, communications, submittals, and other Project-related information. The following conditions and standards will govern use of the Project Website:

1) **[Describe the period of time during which the Project Website will be operated and be available for reliance by the parties]**;

2) **[Provide any minimum system infrastructure, software licensing and security standards for access to and use of the Project Website]**;

3) **[Describe the types and extent of services to be provided at the Project Website (such as large file transfer, email, communication and document archives, etc.)]**; and

4) **[Include any other Project Website attributes that may be pertinent to Contractor's use of the facility and pricing of such use]**.

C. *Software Requirements for Electronic Document Exchange; Limitations*

1. Each party will acquire the software and software licenses necessary to create and transmit Electronic Documents and to read and to use any Electronic Documents received from the other party (and if relevant from third parties), using the software formats required in this section of the EDP.

a. Prior to using any updated version of the software required in this section for sending Electronic Documents to the other party, the originating party will first notify and receive concurrence from the other party for use of the updated version or adjust its transmission to comply with this EDP.

2. The parties agree not to intentionally edit, reverse engineer, decrypt, remove security or encryption features, or convert to another format for modification purposes any Electronic Document or information contained therein that was transmitted in a software data format, including Portable Document Format (PDF), intended by sender not to be modified, unless the receiving party obtains the permission of the sending party or is citing or quoting excerpts of the Electronic Document for Project purposes.

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3. Software and data formats for exchange of Electronic Documents will conform to the requirements set forth in Exhibit A to this EDP, including software versions, if listed.

Guidance Notes—Requests by Contractor for Electronic Documents in Other Formats: SC-2.06.B and SC-2.06.C above constitute an Electronics Document Protocol for transmittal of Electronic Documents. When the Owner desires to retain the option to allow certain documents to be made available to Contractor in formats other than those described in SC-2.06.C of the Protocol, the Owner should add the following Supplementary Condition and release language:

SC-2.06 Supplement Paragraph 2.06 of the General Conditions by adding the following paragraph:

D. *Requests by Contractor for Electronic Documents in Other Formats*

1. Release of any Electronic Document versions of the Project documents in formats other than those identified in the Electronic Documents Protocol (if any) or elsewhere in the Contract will be at the sole discretion of the Owner.

2. To extent determined by Owner, in its sole discretion, to be prudent and necessary, release of Electronic Documents versions of Project documents and other Project information requested by Contractor ("Request") in formats other than those identified in the Electronic Documents Protocol (if any) or elsewhere in the Contract will be subject to the provisions of the Owner's response to the Request, and to the following conditions to which Contractor agrees:

a. The content included in the Electronic Documents created by Engineer and covered by the Request was prepared by Engineer as an internal working document for Engineer's purposes solely, and is being provided to Contractor on an "AS IS" basis without any warranties of any kind, including, but not limited to any implied warranties of fitness for any purpose. As such, Contractor is advised and acknowledges that the content may not be suitable for Contractor's application, or may require substantial modification and independent verification by Contractor. The content may include limited resolution of models, not-to-scale schematic representations and symbols, use of notes to convey design concepts in lieu of accurate graphics, approximations, graphical simplifications, undocumented intermediate revisions, and other devices that may affect subsequent reuse.

b. Electronic Documents containing text, graphics, metadata, or other types of data that are provided by Engineer to Contractor under the request are only for convenience of Contractor. Any conclusion or information obtained or derived from such data will be at the Contractor's sole risk and the Contractor waives any claims against Engineer or Owner arising from use of data in Electronic Documents covered by the Request.

c. Contractor shall indemnify and hold harmless Owner and Engineer and their subconsultants from all claims, damages, losses, and expenses, including attorneys' fees and defense costs arising out of or resulting from Contractor's use, adaptation, or distribution of any Electronic Documents provided under the Request.

d. Contractor agrees not to sell, copy, transfer, forward, give away or otherwise distribute this information (in source or modified file format) to any third party without the direct written authorization of Engineer, unless such distribution is

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specifically identified in the Request and is limited to Contractor's subcontractors. Contractor warrants that subsequent use by Contractor's subcontractors complies with all terms of the Contract Documents and Owner's response to Request.

3. In the event that Owner elects to provide or directs the Engineer to provide to Contractor any Contractor-requested Electronic Document versions of Project information that is not explicitly identified in the Contract Documents as being available to Contractor, the Owner shall be reimbursed by Contractor on an hourly basis (at $**[number]** per hour) for any engineering costs necessary to create or otherwise prepare the data in a manner deemed appropriate by Engineer.

ARTICLE 3—CONTRACT DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 *Intent*

Guidance Notes—Furnishing Contract Documents to Contractor—GC-2.02.A indicates that Owner will furnish four printed (hard) copies of the Contract Documents, and one PDF copy. (See Guidance Note for Paragraph 2.02.) GC-3.01.C states that if there is a discrepancy between the electronic version of the Contract Documents and the printed (hard copy) version, then the printed version controls. If Owner is not furnishing PDF or other electronic files of the Contract Documents, then GC-3.01.C becomes superfluous, and the following may be used:

SC-3.01 Delete Paragraph 3.01.C in its entirety.

ARTICLE 4—COMMENCEMENT AND PROGRESS OF THE WORK

4.05 *Delays in Contractor's Progress*

Guidance Notes—Defining Weather-related Delays—GC-4.05 is arguably one of the most important provisions in the General Conditions because it allocates the risk of delays in the Work. Delays may be costly to the Contractor and Owner, and detrimental to the success of the Project. Delays beyond the Contract Times have the potential to result in the imposition of liquidated and special damages included in the Contract. When there is any change in the allocation of risks for delays from what is included in GC-4.05, a corresponding SC-4.05 is required.

Particular attention should be paid to the provisions of GC-4.05.C, which is the Contract's force majeure clause governing allocation of risks for delays that are beyond the control of both the Contractor and the Owner. Because weather-related delays are so common, the drafter of the Supplementary Conditions may want to consider including a more specific provision regarding weather-related delays, particularly in cases where adherence to the Contract Times is extremely important and where the Work will be of such a nature as to be susceptible to weather-related delays. Sample contract language is presented below as SC-4.05.C. As the following commentary indicates, other approaches are possible and should be considered.

The General Conditions indicate at GC-4.05.C.2 that the Contractor will be entitled to an equitable adjustment in Contract Times if the Work is delayed by "abnormal weather conditions." This standard will be sufficient in most situations, and is applicable to the full range of possible bad weather events. However, the drafter of the specific Contract may wish to define "abnormal weather" by reference to

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objective, measurable weather factors. To draft a supplemental weather-delay provision that defines abnormal weather, the drafter must consider the threshold level of severity of weather that may affect the progress of the Work—the Contractor must anticipate and cope with the weather up to the defined threshold, and if the threshold is reached or exceeded, the Contractor will be entitled to additional time to complete the Work. One such threshold level of severity could be specified to apply to the entire construction (this is the approach taken in the sample SC-4.05.C), or separate levels could be specified for different elements of the Work. As an example of the second alternative, and while it is acknowledged that the parties may not know specific construction activities at the time the initial Contract Documents are prepared, presumed weather severities could be tailored to the materials or type of construction involved. For example, if the Work involves reinforced concrete, the weather conditions that could delay concrete pouring might not reasonably delay erection of formwork or placement of reinforcing steel. The possibility of lingering effects should be considered when drafting such provisions.

In some localities there may be well established and widely accepted procedures for monitoring and evaluating the weather impacts on a construction project, such as the procedures set forth in municipal or state department of transportation standard specifications. The drafter of the Contract Documents may wish to adopt such procedures if relevant to the specific project, as an alternative to the sample procedures set out in the optional SC-4.05.C.

SC-4.05.C, if adopted, ties the definition of "abnormal weather" to two factors, precipitation and temperature. The drafter must establish a threshold amount of daily precipitation that is tolerable in the specific location—any day that incurs an amount at or above the threshold is a bad weather day. Similarly, the drafter must define acceptable temperature thresholds—dropping below the minimum or rising above the maximum will result in categorization as a bad weather day. Finally, the drafter must define how many bad weather days in each category (precipitation, excessively cold weather, excessively hot weather) are foreseeable (essentially "normal" or tolerable) in each month. In most locations, the normal expectation for bad weather in a month will vary with the seasons.

Even if the parties anticipate a short project duration, the table (Exhibit B—Foreseeable Bad Weather Days) that is incorporated in SC-4.05.C should encompass the entire calendar year to ensure that, regardless of postponements, suspensions, or delays, the Work as actually performed is contractually covered by SC-4.05.C. **[SC-4.05.C includes and incorporates the table identified as Exhibit B—Foreseeable Bad Weather Days (located with other exhibits at the end of C-800)].**

An important step in drafting a supplemental clause regarding weather delays is establishing the source for actual weather records and site conditions (for lingering effects) and the required content of such records. A variety of sources may be viable options for weather records, but in general it is better when the weather monitoring site is relatively close to the Site. Sources may include the National Weather Service, media outlets that maintain weather-monitoring networks, certain schools and universities, and possibly wastewater conveyance utilities. Before specifying the source of data, verify that the data is available, and the type of data collected.

The text of SC-4.05.C, defining "abnormal weather" based on precipitation and temperature extremes, is indicated below. If the drafter elects to use this optional Supplementary Condition, edit the example language to suit the Project, and provide the weather thresholds required in the text and in the Exhibit B table.

A few specific Guidance points for SC-4.05.C:

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1. Edit Paragraphs SC-4.05.C.5.b "1).i)" and "1).ii)", to suit the Project; the times specified in Paragraph "1).i)" are presumed times for wet weather to render the Site inoperable for the following workday.
2. Based on recorded weather data available from the weather station indicated in Paragraph SC-4.05.C.5.b "2)", insert in SC-4.05.C.5.b "1).i)" and "1).ii)" the threshold one-day precipitation quantity and the threshold temperatures (minimum and maximum).
3. Insert in the appropriate blanks in Paragraph SC-4.05.C.5.b "2)" below the entity operating and maintaining the weather station, and the location of the weather station; for example, "National Weather Service weather monitoring station at the Buffalo-Niagara International Airport." For the selected entity and site, verify the data types and frequency available for the particular weather monitoring station.
4. Based on data from the weather monitoring station indicated in Paragraph SC-4.05.C.5.b "2)", fill in all the cells in the table identified as Exhibit B—Foreseeable Bad Weather Days. Optimally, data indicated should be averaged over a period of not less than five years although other durations may be appropriate. Edit the sample language when other foreseeable weather factors can affect the construction, such as high winds or other factors.

SC-4.05 Amend Paragraph 4.05.C by adding the following subparagraphs:

5. *Weather-Related Delays*

a. If "abnormal weather conditions" as set forth in Paragraph 4.05.C.2 of the General Conditions are the basis for a request for an equitable adjustment in the Contract Times, such request must be documented by data substantiating each of the following: 1) that weather conditions were abnormal for the period of time in which the delay occurred, 2) that such weather conditions could not have been reasonably anticipated, and 3) that such weather conditions had an adverse effect on the Work as scheduled.

b. The existence of abnormal weather conditions will be determined on a month-by-month basis in accordance with the following:

1) Every workday on which one or more of the following conditions exist will be considered a "bad weather day":

i) Total precipitation (as rain equivalent) occurring between 7:00 p.m. on the preceding day (regardless of whether such preceding day is a workday) through 7:00 p.m. on the workday in question equals or exceeds **[threshold precipitation quantity]** of precipitation (as rain equivalent, based on the snow/rain conversion indicated in the table entitled Foreseeable Bad Weather Days; such table is hereby incorporated in this SC-4.05.C by reference.

ii) Ambient outdoor air temperature at 11:00 a.m. is equal to or less than the following low temperature threshold: **[temperature]** degrees Fahrenheit; or, at 3:00 p.m. the ambient outdoor temperature is equal to or greater than the following high temperature threshold: **[temperature]** degrees Fahrenheit.

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2) Determination of actual bad weather days during performance of the Work will be based on the weather records measured and recorded by **[name of the entity operating the weather station]** weather monitoring station at **[location of the weather monitoring station]**.

3) Contractor shall anticipate the number of foreseeable bad weather days per month indicated in the table in Exhibit **[exhibit number]**—Foreseeable Bad Weather Days.

4) In each month, every bad weather day exceeding the number of foreseeable bad weather days established in the table in Exhibit **[exhibit number]**—Foreseeable Bad Weather Days will be considered as "abnormal weather conditions." The existence of abnormal weather conditions will not relieve Contractor of the obligation to demonstrate and document that delays caused by abnormal weather are specific to the planned work activities or that such activities thus delayed were on Contractor's then-current Progress Schedule's critical path for the Project.

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

5.03 *Subsurface and Physical Conditions*

Guidance Notes—Reports and Drawings Containing Technical Data (Subsurface; Physical Conditions)

1. This is a mandatory Supplementary Condition. Paragraph 5.03, Subsurface and Physical Conditions, of the General Conditions requires the identification of reports and drawings that contain Technical Data regarding subsurface and physical conditions at or adjacent to the Site. See GC-5.03.A.1 and 2. This will typically include current and recent geotechnical reports, drawings of existing subsurface and surface conditions (including structures such as buildings and foundations), and any other documents that Owner or Engineer has determined to contain reliable Site information. GC-5.03.A.3 requires the identification of the specific Technical Data in the reports and drawings. This is an important task because only the Technical Data is entitled to reliance by Contractor—the remainder of the contents of the reports and drawings does not receive this elevated status.
2. Typical examples of the contents of Site-related reports and drawings that might be categorized by Owner or Engineer as Technical Data for contractual purposes are:
    a. boring logs;
    b. recorded measurements of subsurface water levels;
    c. assessments of the condition of subsurface facilities;
    d. laboratory test results; and
    e. mapping based on remote sensing.
3. Use SC-5.03, presented immediately below, for the purpose of identifying the Site condition documents that contain Technical Data, and the specific Technical Data contained in each report and drawing.

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4. In a change from the two previous editions of the EJCDC Construction Series documents (2013 and 2007), the user should not list all archival and other documents concerning the Site here in the Supplementary Conditions—as of 2018, for GC/SC-5.03 list in the Supplementary Conditions only those documents determined by Owner or Engineer to contain Technical Data.

5. *Filling in the tables:* SC-5.03.E contains a table for listing reports that contain Technical Data, and identifying that data; and SC-5.03.F contains a table for listing drawings that contain Technical Data. Examples of a completed row from each table follow, for illustrative purposes only:

E. The following table lists the reports of explorations and tests of subsurface conditions at or adjacent to the Site that contain Technical Data, and specifically identifies the Technical Data in the report upon which Contractor may rely:

Report Title	Date of Report	Technical Data
Results of Investigation of Subsoil Conditions and Geotechnical Recommendations—Riverside Wastewater Treatment Plant	August 8, 2018	Boring Log, Test Site 1, at page 32 of Report.

F. The following table lists the 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 specifically identifies the Technical Data upon which Contractor may rely:

Drawings Title	Date of Drawings	Technical Data
Record Drawings: Route 24 Overpass Abutment Project	November 30, 2012	All information in drawings, with the exception of the contents of Drawings 001 and 005.

6. In addition to requiring the identification of Technical Data in SC-5.03, EJCDC also requires that Owner identify and disclose to Bidders archival and other Site-related documents known to Owner (but that do not contain Technical Data and therefore are not listed here in the Supplementary Conditions), in a list distributed with the Instructions to Bidders. See Instructions to Bidders, Article 5. The Bidders may then review documents of interest, and perhaps glean information useful to them in fashioning a bid and planning the Work. There is no requirement, however, that Bidders or the Contractor review the documents disclosed in the Instructions to Bidders, nor are they held accountable for any data or information in such documents; similarly, Owner has not verified the data or information in these documents, and is not responsible for their accuracy. The requirement that Contractor review and take responsibility for Site information is limited to information in (1) the Contract Documents and (2) the Technical Data.

7. If the Supplementary Conditions neglect to expressly identify the Technical Data entitled to reliance, then certain data in documents such as a geotechnical report, environmental report, or similar investigative report prepared for the current Project are, by default definition, Technical Data upon whose accuracy Contractor may rely. See the default definition of Technical Data, GC-1.01.A.46.b.

8. Paragraph GC-5.03.B clarifies that Underground Facilities are shown or indicated in the Drawings. Requirements with respect to Underground Facilities are set forth in Paragraph GC-5.05.

9. Paragraph GC-5.06 requires disclosure of documents relating to Hazardous Environmental Conditions at the Site. Note that these requirements differ from the requirements regarding disclosure of documents relating to subsurface and physical conditions in GC-5.03, and here in SC-5.03.

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10. If Owner elects to furnish a Geotechnical Baseline Report (GBR), use the alternate SC/GBR-5.03 and SC/GBR-5.04 presented in Exhibit C to this document, rather than the SC-5.03 version immediately following. **[Exhibit C is located at the end of C-800.]**

SC-5.03 Add the following new paragraphs immediately after Paragraph 5.03.D:

E. The following table lists the reports of explorations and tests of subsurface conditions at or adjacent to the Site that contain Technical Data, and specifically identifies the Technical Data in the report upon which Contractor may rely: **[If there are no such reports, so indicate in the table.]**

Report Title	Date of Report	Technical Data
		[Identify Technical Data]

F. The following table lists the 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 specifically identifies the Technical Data upon which Contractor may rely: **[If there are no such drawings, so indicate in the table.]**

Drawings Title	Date of Drawings	Technical Data
		[Identify Technical Data]

G. Contractor may examine copies of reports and drawings identified in SC-5.03.E and SC-5.03.F that were not included with the Bidding Documents at **[location]** during regular business hours, or may request copies from Engineer.

5.06 *Hazardous Environmental Conditions*

Guidance Notes—Reports and Drawings Regarding Hazardous Environmental Conditions—This is a mandatory Supplementary Condition. Paragraph 5.06 of the General Conditions contemplates that Owner will identify all known documents regarding Hazardous Environmental Conditions (HEC) that have been identified at or adjacent to the Site. It also requires the identification of Technical Data (upon whose accuracy Contractor may rely) contained in such documents. Use SC-5.06, presented immediately below, to identify the known HEC documents. Refer to Guidance Note 5 preceding SC-5.03 for examples of completed rows of tables similar to the tables in SC-5.06. Also note that if either a geotechnical report or environmental report has been prepared for the Project, and the Supplementary Conditions neglect to expressly identify reports or drawings or reports' or drawings' Technical Data upon whose accuracy Contractor may rely, then the default definition of Technical Data in Paragraph GC-1.01.A.46.b of the General Conditions will apply.

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SC-5.06 Add the following new paragraphs immediately after Paragraph 5.06.A.3:

4. The following table lists the reports known to Owner relating to Hazardous Environmental Conditions at or adjacent to the Site, and the Technical Data (if any) upon which Contractor may rely: **[If there are no such reports, so indicate in the table]**

Report Title	Date of Report	Technical Data
		[Identify Technical Data]

5. The following table lists the drawings known to Owner relating to Hazardous Environmental Conditions at or adjacent to the Site, and Technical Data (if any) contained in such Drawings upon which Contractor may rely: **[If there are no such drawings, so indicate in the table]**

Drawings Title	Date of Drawings	Technical Data
		[Identify Technical Data]

ARTICLE 6—BONDS AND INSURANCE

6.01 *Performance, Payment, and Other Bonds*

Guidance Notes—Performance and Payment Bonds

1. *Deletion of Performance/Payment Bond Requirement:* Paragraph 6.01.A of the General Conditions requires that Contractor furnish a performance bond and a payment bond. If performance and payment bonds are not required for a specific Contract, include a Supplementary Condition that deletes the GC-6.01.A requirement.
2. *Performance/Payment Bond Forms:* Paragraph 6.01.C requires that all bonds be "in the form included in the Bidding Documents or otherwise specified by Owner prior to execution of the Contract…." Some Owners may have in-house bond forms that must be used, or in some instances state or local law may mandate a specific bond form. In all other cases, EJCDC recommends that its standard performance and payment bond forms, EJCDC® C-610, Performance Bond (2018), and EJCDC® C-615, Payment Bond (2018), be included or specified. These bond forms were developed in collaboration by EJCDC with other principal design, construction, and surety organizations, and as a result contain industry-standard wording, organization, and terminology. (The 2010, 2013, and 2018 editions of these two bonds are essentially identical, and interchangeable.) Most sureties and bond producers have templates of the EJCDC bonds and can issue them readily.
3. If the EJCDC performance and payment bonds are required, EJCDC recommends that prospective Bidders or contractors be given sample copies of the two bond forms (typically as a part of the Bidding Documents), and buttress the requirement with an express Supplementary Condition specifying the use of the standard EJCDC bonds. The Supplementary Condition for that purpose follows.

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SC-6.01 Add the following paragraphs immediately after Paragraph 6.01.A:

1. *Required Performance Bond Form:* The performance bond that Contractor furnishes will be in the form of EJCDC® C-610, Performance Bond (2010, 2013, or 2018 edition).
2. *Required Payment Bond Form:* The payment bond that Contractor furnishes will be in the form of EJCDC® C-615, Payment Bond (2010, 2013, or 2018 edition).

Guidance Notes—"Other Bonds," Warranty Bond

1. Other Bonds

Paragraph 6.01.B states that if Contractor is required to provide a bond other than a performance or payment bond, the requirement will be set forth in the Supplementary Conditions. This statement is not relevant or related to a requirement that a Bidder must furnish a Bid Bond: such a requirement (if any) is part of the bidding process that occurs before entry into the construction contract, and the bid bond requirement would be included in the Instructions to Bidders. See Instructions to Bidders, Article 8. Rather, the reference is to any special purpose bond that is required.

2. Warranty Bond

Perhaps the most common "other" or special purpose bond that might be required is the warranty bond (also called a maintenance bond). A warranty bond provides assurance that Contractor (or if necessary the surety) will meet the contractual correction period obligations during a specified period of time after construction has been completed.

SC-6.01.B.1 presents model wording for requiring that Contractor furnish a warranty bond. EJCDC's standard form for such a bond is EJCDC® C-612, Warranty Bond (2018); if SC-6.01.B.1 is used, the Warranty Bond form should be provided to bidders or prospective contractors with the Supplementary Conditions (typically as a part of the Bidding Documents).

The C-612 Warranty Bond is intended to be used to provide bonding for a period of time greater than one year after Substantial Completion. EJCDC® C-610, Performance Bond (2018) already obligates the surety with respect to the correction of defective Work (C-610, Paragraph 7.1), and has a duration sufficient to allow bond claims based on defects discovered during the standard one-year correction period (GC-6.01.A; C-610, Paragraph 11); and the purchase price charged for the performance bond is based on that bond remaining in effect during the one-year correction period. Thus, a warranty bond is not needed if the correction period remains the standard one year, and indeed would be redundant with the performance bond if used solely to cover that one-year correction period.

To avoid possible conflicts regarding responsibilities between the surety that issues the performance bond and the surety that issues the warranty bond, EJCDC recommends a requirement that the two bonds be issued by the same surety. See SC-6.01.B.3.

Although in theory a warranty bond could be furnished for a very lengthy duration (four or more years beyond Substantial Completion), such a lengthy bond would probably be commercially difficult to obtain and very expensive. EJCDC recommends an endpoint for the warranty bond of either two years after Substantial Completion (essentially extending the bonded coverage by one additional year) or three years after Substantial Completion (extending the bonded coverage by two additional years). These two recommended options are embedded in the C-612 Warranty Bond form.

By its terms the EJCDC warranty bond applies to the contractual correction obligation at GC-15.08. SC-6.01.B.2 extends that contractual correction period beyond its standard one-year duration—the

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contractual extension should match the Warranty Bond duration. For the sake of clarity, EJCDC recommends a cross-reference to Supplementary Condition SC-15.08.A—see Article 15 below.

Because correction period work is, in total, likely to cost only a modest fraction of the Contract Price, warranty bonds typically have a bond amount that is 10 or 15 percent of the Contract Price. The precise percentage required should be clearly indicated in the Supplementary Condition.

The suggested wording to extend the correction period and require that Contractor furnish a warranty bond follows:

SC-6.01 Add the following paragraphs immediately after Paragraph 6.01.B:

1. The correction period specified as one year after the date of Substantial Completion in Paragraph 15.08.A of the General Conditions is hereby revised to be **[number—either 2, 3, or other]** years after Substantial Completion.

2. After Substantial Completion, Contractor shall furnish a warranty bond issued in the form of EJCDC® C-612, Warranty Bond (2018). The warranty bond must be in a bond amount of **[number—either 10, 15, or other]** percent of the final Contract Price. The warranty bond period will extend to a date **[number—either 2, 3, or other]** years after Substantial Completion of the Work. Contractor shall deliver the fully executed warranty bond to Owner prior to or with the final application for payment, and in any event no later than 11 months after Substantial Completion.

3. The warranty bond must be issued by the same surety that issues the performance bond required under Paragraph 6.01.A of the General Conditions.

6.02 *Insurance—General Provisions*

Guidance Notes—Modifying Insurance Company Ratings Requirements—Paragraph 6.02.B of the General Conditions requires that all companies that provide insurance policies required under this Contract must have an A.M. Best rating of A-VII or better, unless a different standard is indicated in the Supplementary Conditions. The A.M. Best ratings are based on the financial strength and size of the insurance company, with A-VII representing a commonly used standard. SC-6.02 is the location for noting any different standard, whether narrower or broader.

In some states, not all worker's compensation insurers obtain A.M. Best ratings. The Owner may wish to include the following optional exception (modified to meet applicable provisions in the state) to the requirement in Paragraph 6.02.B:

SC-6.02 Add the following paragraph immediately after Paragraph 6.02.B:

1. Contractor may obtain worker's compensation insurance from an insurance company that has not been rated by A.M. Best, provided that such company (a) is domiciled in the state in which the Project is located, (b) is certified or authorized as a worker's compensation insurance provider by the appropriate state agency, and (c) has been accepted to provide worker's compensation insurance for similar projects by the state within the last 12 months.

Guidance Notes—Specifying Insurance to be carried by Subcontractors and Suppliers—GC-6.02.H indicates that Contractor must require its Subcontractors and Suppliers to purchase and maintain

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insurance that is appropriate for their participation in the Project. This provision intentionally gives Contractor considerable latitude in risk management with respect to its Subcontractors and Suppliers. In most cases the Contractor will have more familiarity than Owner with the risks associated with particular types of subcontracted work, with the Subcontractors and Suppliers selected, and with the insurance coverage requirements that should be imposed. Occasionally, however, the Owner will choose to establish insurance requirements that apply to some or all Subcontractors or Suppliers. SC-6.02.H.3 may be used for that purpose.

SC-6.02 Add the following paragraph immediately after Paragraph 6.02.H.2 of the General Conditions:

3. For the following Subcontractors, Suppliers, or categories of Subcontractor or Supplier, Contractor shall require the following specified insurance, with policy limits as stated: **[Identify Subcontractors, Suppliers, or categories of same, and insert specific insurance requirements and policy limits]**

6.03 *Contractor's Insurance*

Guidance Notes—Specifying Contractor's Insurance, Including Coverage Limits—This is a mandatory Supplementary Condition, because it is the location for specifying the insurance policies, coverages, and endorsements to be maintained by Contractor (other than builder's risk and other property insurance, which are addressed in SC-6.04), and the minimum coverage limits. However, not all components of SC-6.03 will be used for the specific Contract that is being drafted, and many parts may need to be modified or revised to meet specific insurance requirement objectives. Consultation with risk managers, insurance specialists, and legal counsel is a necessity.

The information set forth in this Supplementary Condition (and in all other contractual provisions regarding bonds and insurance) is typically provided by Owner, either directly or through written instructions given to Engineer (see EJCDC® C-051, Engineer's Letter to Owner Requesting Instructions Concerning Bonds and Insurance (2018), and EJCDC® C-052, Owner's Instructions to Engineer Concerning Bonds and Insurance (2018)).

The user should refer to the following Guidance points with respect to specific features of SC-6.03, including categories of insurance with unique features (such as Umbrella or Excess Liability insurance, SC-6.03.K), or that are required only under specific circumstances (such as Railroad Protective Liability insurance, SC-6.03.O):

1. *Deciding Whether to Require Umbrella/Excess Insurance:* SC-6.03.K, Umbrella or Excess Liability, is a standard insurance provision that requires Contractor to carry an Umbrella or Excess Liability policy. Some Owners do not require that Contractor carry Umbrella/Excess insurance, perhaps viewing the decision to obtain and maintain Umbrella/Excess, and the specific amount of Umbrella/Excess coverage, as risk management choices best left to the Contractor; and presumably in such cases the Owner accepts that the primary policies (most importantly Commercial General Liability), as specified, provide adequate protection.

   If Owner revises the standard terms by deleting the requirement that Contractor provide Excess or Umbrella liability insurance, then Owner may wish to consider requiring (in SC-6.03.G, Commercial General Liability—Form and Content) that "The general aggregate limits under SC-6.03.I (Commercial General Liability—Minimum Policy Limits) be maintained fully available for this Contract by obtaining

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and maintaining a Designated Construction Project General Aggregate Limit endorsement, or equivalent."

2. *Allowing the Umbrella/Excess Insurance to Satisfy Underlying Coverage Requirements*

   a. The optional Supplementary Condition SC-6.03.L, Using Umbrella or Excess Liability to Meet CGL and Other Policy Limit Requirements, is used to contractually authorize the common practice in which an Owner allows Contractor to meet the required minimum policy limits for commercial general liability and other primary liability policies by attributing a portion of Umbrella/Excess coverage to the underlying policy or policies. For example, if the Contract requires $5 million in CGL coverage; SC-6.03.L specifies (in the brackets in the last sentence) that a minimum of $3 million of the Umbrella must remain unattributed to any underlying policy; and Contractor has a CGL policy of $3 million and a $10 million Umbrella policy, then $2 million of the Umbrella could be attributed to the CGL, to meet the $5 million CGL minimum. Under that example, such attribution would still leave a "balance" of $8 million under the Umbrella, thus satisfying the requirement that a minimum of $3 million of the Umbrella remain unattributed to any underlying policy.

   b. In those cases in which SC-6.03.L, Using Umbrella or Excess Liability Insurance to Meet CGL and Other Policy Limit Requirements, is used, it is important fill in the brackets in the last sentence, specifying the unattributed balance that is the appropriate amount for the specific Contract.

   c. Not all Owners will choose to allow an Umbrella/Excess policy to provide partial satisfaction of a primary liability policy coverage requirement, preferring the simpler approach of Contractor providing an underlying policy (most notably, CGL) in the full amount required. When this is the preference, do not include SC-6.03.L, Using Umbrella or Excess Liability Insurance to Meet CGL and Other Policy Limit Requirements.

3. *Combining Contractor's Pollution and Professional Liability Policies:* Contractor's Pollution Liability Insurance (SC-6.03.M) and Contractor's Professional Liability Insurance (SC-6.03.N) are presented as two distinct required policies. However, Contractor's Pollution Liability and Contractor's Professional Liability policies are sometimes sold as a hybrid or combined policy. After consulting with its risk managers, Owner may wish to supplement the two provisions with a statement indicating that Contractor may provide such a combination policy, as an acceptable alternative to providing two separate policies, at a stated policy limit for the combination policy.

4. *Railroad Protective Liability Policy:* If any portion of the Work will take place within 50 feet of railroad-owned or controlled property, the railroad company will likely require that the Contractor obtain a railroad protective liability policy. Use Paragraph SC-6.03.O below if such a policy is required.

   A railroad protective liability policy is for the benefit of the railroad company (not the Contractor or Owner), providing the railroad with protection from both liability and property damage it incurs because of the Contractor's construction activities. The railroad protective policy is site-specific, and applies only when work is in progress—it does not include completed operations coverage.

   The standard coverage includes bodily injury or property damage that arises out of the acts or omissions of railroad employees, to the extent the acts or omissions are related to or in connection with the Contractor's activities. The coverage of physical damage to property should apply to real and personal property that is owned or leased by the railroad, including rolling stock, tracks, trestles, buildings, and structures.

   The railroad will usually have specific requirements for the railroad protective policy, including per-claim and aggregate policy limits, coverages, and the formal names of the railroad and other related

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insureds. In most cases the railroad will require an indemnification from Contractor, in addition to the insurance policy. The Owner or other drafter should include all known railroad requirements here or elsewhere in the Contract, if the requirements are known at the time the Contract is drafted.

5. *Unmanned Aerial Vehicle Liability Insurance:* The use of aerial drones on construction projects is increasingly common. If there is a possibility that Contractor will use drones on the specific Project, Owner may wish to include SC-6.03.P, Unmanned Aerial Vehicle Liability Insurance.

6. *Other Required Insurance:* If Owner or its insurance advisors or risk managers have identified other insurance policies that Contractor should obtain and maintain, based on the Owner's or Project's specific needs, identify the required policies and minimum policy limits at SC-6.03.Q. Note that Builder's Risk insurance is separately addressed in GC/SC-6.04.

SC-6.03 Supplement Paragraph 6.03 with the following provisions after Paragraph 6.03.C:

D. *Other Additional Insureds:* As a supplement to the provisions of Paragraph 6.03.C of the General Conditions, the commercial general liability, automobile liability, umbrella or excess, pollution liability, and unmanned aerial vehicle liability policies must include as additional insureds (in addition to Owner and Engineer) the following: **[Here list by legal name (not category, role, or classification) other persons or entities to be included as additional insureds. See GC-6.03.C.]**

E. *Workers' Compensation and Employer's Liability:* Contractor shall purchase and maintain workers' compensation and employer's liability insurance, including, as applicable, United States Longshoreman and Harbor Workers' Compensation Act, Jones Act, stop-gap employer's liability coverage for monopolistic states, and foreign voluntary workers' compensation (from available sources, notwithstanding the jurisdictional requirement of Paragraph 6.02.B of the General Conditions).

Workers' Compensation and Related Policies	Policy limits of not less than:
Workers' Compensation	
State	Statutory
Applicable Federal (e.g., Longshoreman's)	Statutory
Foreign voluntary workers' compensation (employer's responsibility coverage), if applicable	Statutory
Jones Act (if applicable)	
Bodily injury by accident—each accident	$
Bodily injury by disease—aggregate	$
Employer's Liability	
Each accident	$
Each employee	$
Policy limit	$
Stop-gap Liability Coverage	
For work performed in monopolistic states, stop-gap liability coverage must be endorsed to either the worker's compensation or commercial general liability policy with a minimum limit of:	$

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F. *Commercial General Liability—Claims Covered:* Contractor shall purchase and maintain commercial general liability insurance, covering all operations by or on behalf of Contractor, on an occurrence basis, against claims for:

1. damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees,
2. damages insured by reasonably available personal injury liability coverage, and
3. damages because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom.

G. *Commercial General Liability—Form and Content:* Contractor's commercial liability policy must be written on a 1996 (or later) Insurance Services Organization, Inc. (ISO) commercial general liability form (occurrence form) and include the following coverages and endorsements:

1. Products and completed operations coverage.
    a. Such insurance must be maintained for three years after final payment.
    b. Contractor shall furnish Owner and each other additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract) evidence of continuation of such insurance at final payment and three years thereafter.
2. Blanket contractual liability coverage, including but not limited to coverage of Contractor's contractual indemnity obligations in Paragraph 7.18.
3. Severability of interests and no insured-versus-insured or cross-liability exclusions.
4. Underground, explosion, and collapse coverage.
5. Personal injury coverage.
6. Additional insured endorsements that include both ongoing operations and products and completed operations coverage through ISO Endorsements CG 20 10 10 01 and CG 20 37 10 01 (together). If Contractor demonstrates to Owner that the specified ISO endorsements are not commercially available, then Contractor may satisfy this requirement by providing equivalent endorsements.
7. For design professional additional insureds, ISO Endorsement CG 20 32 07 04 "Additional Insured—Engineers, Architects or Surveyors Not Engaged by the Named Insured" or its equivalent.

H. *Commercial General Liability—Excluded Content:* The commercial general liability insurance policy, including its coverages, endorsements, and incorporated provisions, must not include any of the following:

1. Any modification of the standard definition of "insured contract" (except to delete the railroad protective liability exclusion if Contractor is required to indemnify a railroad or others with respect to Work within 50 feet of railroad property).
2. Any exclusion for water intrusion or water damage.
3. Any provisions resulting in the erosion of insurance limits by defense costs other than those already incorporated in ISO form CG 00 01.
4. Any exclusion of coverage relating to earth subsidence or movement.

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5. Any exclusion for the insured's vicarious liability, strict liability, or statutory liability (other than worker's compensation).

6. Any limitation or exclusion based on the nature of Contractor's work.

7. Any professional liability exclusion broader in effect than the most recent edition of ISO form CG 22 79.

I. *Commercial General Liability—Minimum Policy Limits*

Commercial General Liability	**Policy limits of not less than:**
General Aggregate	$
Products—Completed Operations Aggregate	$
Personal and Advertising Injury	$
Bodily Injury and Property Damage—Each Occurrence	$

J. *Automobile Liability:* Contractor shall purchase and maintain automobile liability insurance for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance, or use of any motor vehicle. The automobile liability policy must be written on an occurrence basis.

Automobile Liability	**Policy limits of not less than:**
Bodily Injury	
Each Person	$
Each Accident	$
Property Damage	
Each Accident	$
[or]	
Combined Single Limit	
Combined Single Limit (Bodily Injury and Property Damage)	$

K. *Umbrella or Excess Liability:* Contractor shall purchase and maintain umbrella or excess liability insurance written over the underlying employer's liability, commercial general liability, and automobile liability insurance described in the Paragraphs above. The coverage afforded must be at least as broad as that of each and every one of the underlying policies.

Excess or Umbrella Liability	**Policy limits of not less than:**
Each Occurrence	$
General Aggregate	$

L. *Using Umbrella or Excess Liability Insurance to Meet CGL and Other Policy Limit Requirements:* Contractor may meet the policy limits specified for employer's liability, commercial general liability, and automobile liability through the primary policies alone, or through combinations of the primary insurance policy's policy limits and partial attribution of the policy limits of an umbrella or excess liability policy that is at least as broad in coverage as that of the underlying policy, as specified herein. If such umbrella or excess liability policy

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was required under this Contract, at a specified minimum policy limit, such umbrella or excess policy must retain a minimum limit of $**[specify amount]** after accounting for partial attribution of its limits to underlying policies, as allowed above.

M. *Contractor's Pollution Liability Insurance:* Contractor shall purchase and maintain a policy covering third-party injury and property damage, including cleanup costs, as a result of pollution conditions arising from Contractor's operations and completed operations. This insurance must be maintained for no less than three years after final completion.

Contractor's Pollution Liability	**Policy limits of not less than:**
Each Occurrence/Claim	$
General Aggregate	$

N. *Contractor's Professional Liability Insurance:* If Contractor will provide or furnish professional services under this *Contract*, through a delegation of professional design services or otherwise, then Contractor shall be responsible for purchasing and maintaining applicable professional liability insurance. This insurance must cover negligent acts, errors, or omissions in the performance of professional design or related services by the insured or others for whom the insured is legally liable. The insurance must be maintained throughout the duration of the Contract and for a minimum of two years after Substantial Completion. The retroactive date on the policy must pre-date the commencement of furnishing services on the Project.

Contractor's Professional Liability	**Policy limits of not less than:**
Each Claim	$
Annual Aggregate	$

O. *Railroad Protective Liability Insurance:* Prior to commencing any Work within 50 feet of railroad-owned and controlled property, Contractor shall (1) endorse its commercial general liability policy with ISO CG 24 17, removing the contractual liability exclusion for work within 50 feet of a railroad, (2) purchase and maintain railroad protective liability insurance meeting the following requirements, (3) furnish a copy of the endorsement to Owner, and (4) submit a copy of the railroad protective policy and other railroad-required documentation to the railroad, and notify Owner of such submittal.

[Insert additional specific requirements, commonly set by the railroad, here.]

Railroad Protective Liability Insurance	**Policy limits of not less than:**
Each Claim	$
Aggregate	$

P. *Unmanned Aerial Vehicle Liability Insurance:* If Contractor uses unmanned aerial vehicles (UAV—commonly *referred* to as drones) at the Site or in support of any aspect of the Work, Contractor shall obtain UAV liability insurance in the amounts stated; name Owner, Engineer, and all individuals and entities identified in the Supplementary Conditions as additional

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insureds; and provide a certificate to Owner confirming Contractor's compliance with this requirement. Such insurance will provide coverage for property damage, bodily injury or death, and invasion of privacy.

Unmanned Aerial Vehicle Liability Insurance	Policy limits of not less than:
Each Claim	$
General Aggregate	$

Q. *Other Required Insurance:* **[Here list additional types and amounts of insurance that Contractor is required to carry.]**

6.04 *Builder's Risk and Other Property Insurance*

Guidance Notes—Owner Purchase of Builder's Risk Insurance—The General Conditions require the Contractor to purchase and maintain builder's risk insurance. GC-6.04.A. The detailed requirements for the builder's risk insurance are set forth here in the Supplementary Conditions, in provisions such as SC-6.04.F, G, and H. (The option of requiring the Contractor to purchase an installation floater, as an alternative to builder's risk insurance, is presented in the alternate SC-6.04.A that follows the more commonly used builder's risk clauses.)

In the event that the builder's risk purchase requirement will be flipped, such that the Owner, rather than the Contractor, will purchase the builder's risk insurance, use the following SC-6.04.A:

SC-6.04 Delete Paragraph 6.04.A and insert the following in its place:

A. Owner 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.

Guidance Notes—Builder's Risk Insurance Requirements—The standard builder's risk requirements in this Supplementary Condition may include some items that are not applicable to the specific Project. The user should revise the requirements based on knowledge of the Project, risk management analysis, and consultation with Owner's insurance advisors and legal counsel. The requirements are intended to be used regardless of whether the Contractor purchases the builder's risk insurance (the default assumption, as stated in GC-6.04.A), or the purchase responsibility is flipped to the Owner (see SC-6.04.A immediately above).

Some coverages, such as coverage of property in temporary storage, or coverage of property in transit, are commonly subject to sublimits—specific monetary caps on the amount of coverage. Although a sublimit may be appropriate (or at least tolerable) for some risk categories, the drafter should consult with an insurance advisor and specify a minimum for each sublimit, to avoid underinsuring the risk of a loss in such a coverage category. The provisions of SC-6.04.F indicate when a coverage category is likely to be subject to a sublimit, and provide a place for specifying an acceptable minimum. See SC-6.04.F.4, 5, and 12. SC-6.04.F.13 provides a location for specifying other sublimits.

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SC-6.04.F.5 requires coverage of construction materials "in transit." Specific policies may define this as being limited to domestic, overland transit, such as rail or truck transit. Because the risk of loss in transit will ultimately be borne by Contractor, a risk that is not within the scope of the specific builder's risk insurance policy (a loss during shipment from overseas, for example) could be managed separately by Contractor in its purchase agreement with the vendor.

SC-6.04 Supplement Paragraph 6.04 of the General Conditions with the following provisions:

F. *Builder's Risk Requirements:* The builder's risk insurance must:

1. be written on a builder's risk "all risk" policy form that at a minimum includes insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment stored and in transit, and must not exclude the coverage of the following risks: fire; windstorm; hail; flood; earthquake, volcanic activity, and other earth movement; lightning; riot; civil commotion; terrorism; vehicle impact; aircraft; smoke; theft; vandalism and malicious mischief; mechanical breakdown, boiler explosion, and artificially generated electric current; collapse; explosion; debris removal; demolition occasioned by enforcement of Laws and Regulations; and water damage (other than that caused by flood).

    a. Such policy will include an exception that results in coverage for ensuing losses from physical damage or loss with respect to any defective workmanship, methods, design, or materials exclusions.

    b. If insurance against mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake, volcanic activity, and other earth movement; or flood, are not commercially available under builder's risk policies, by endorsement or otherwise, such insurance will be provided through other insurance policies acceptable to Owner and Contractor.

2. cover, as insured property, at least the following: (a) the Work and all materials, supplies, machinery, apparatus, equipment, fixtures, and other property of a similar nature that are to be incorporated into or used in the preparation, fabrication, construction, erection, or completion of the Work, including Owner-furnished or assigned property; (b) spare parts inventory required within the scope of the Contract; and (c) temporary works which are not intended to form part of the permanent constructed Work but which are intended to provide working access to the Site, or to the Work under construction, or which are intended to provide temporary support for the Work under construction, including scaffolding, form work, fences, shoring, falsework, and temporary structures.

3. cover expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of contractors, engineers, and architects).

4. extend to cover damage or loss to insured property while in temporary storage at the Site or in a storage location outside the Site (but not including property stored at the premises of a manufacturer or Supplier). If this coverage is subject to a sublimit, such sublimit will be a minimum of $**[amount]**.

5. extend to cover damage or loss to insured property while in transit. If this coverage is subject to a sublimit, such sublimit will be a minimum of $**[amount]**.

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6. allow for the waiver of the insurer's subrogation rights, as set forth in this Contract.

7. allow for partial occupancy or use by Owner by endorsement, and without cancellation or lapse of coverage.

8. include performance/hot testing and start-up, if applicable.

9. be maintained in effect until the Work is complete, as set forth in Paragraph 15.06.D of the General Conditions, or until written confirmation of Owner's procurement of property insurance following Substantial Completion, whichever occurs first.

10 include as named insureds the Owner, Contractor, Subcontractors (of every tier), and any other individuals or entities required by this Contract to be insured under such builder's risk policy. For purposes of Paragraphs 6.04, 6.05, and 6.06 of the General Conditions, and this and all other corresponding Supplementary Conditions, the parties required to be insured will be referred to collectively as "insureds." In addition to Owner, Contractor, and Subcontractors of every tier, include as insureds the following:

    a. **[Here list by legal name (not category, role, or classification) other persons or entities to be included on the builder's risk policy as named insureds. It is generally recommended to list the insured's full legal/contractual name, address, contact person, telephone, and e-mail address. Include only persons or entities that have property at the Site that is to be insured by the builder's risk insurance. If applicable, separately identify any mortgagee or lender required to be named as a loss payee.]**

11. include, in addition to the Contract Price amount, the value of the following equipment and materials to be installed by the Contractor but furnished by the Owner or third parties:

    a. **[Here list or provide cross-reference to specific items of Owner-furnished (or third-party furnished) equipment, and purchase value; do not list items whose value is already included in the Contract Price.]**

12. If debris removal in connection with repair or replacement of insured property is subject to a coverage sublimit, such sublimit will be a minimum of $**[amount]**.

13. In addition to the coverage sublimits stated above, the following coverages are also subject to sublimits, as follows:

    a. **[Here list a specific coverage, or cause of loss, that has been determined to be likely to be subject to a sublimit. If not applicable, then delete Paragraph SC-6.04.F.13 in its entirety.]** If this coverage is subject to a sublimit, such sublimit will be a minimum of $**[amount]**.

Guidance Notes—Loss of Revenue and "Soft Cost" Coverage—The basic coverage of a builder's risk policy provides compensation for direct physical loss or damage to the Work. Such loss or damage often has secondary impacts associated with delays in completion of the Work. One significant secondary impact is loss of revenue. Another broad category of secondary impacts is often referred to as "soft costs"—extended financing costs, management and engineering expenses, tax and permit costs, and insurance.

It is usually possible to expand the basic builder's risk coverage to insure against loss of revenue and soft cost losses. SC-6.04.G provides a starting point for doing so. This clause should be reviewed carefully and

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supplemented as needed to obtain the coverage needed for the specific Project. Substantial input from Owner, working in conjunction with an insurance broker or consultant, is necessary to identify specific soft cost exposures, and to quantify the scope of possible losses. Without such input, it would be impossible for the builder's risk underwriters to assess risks and develop an appropriate premium.

For example, if soft cost coverage will extend to loss of revenue of a processing facility if it is completed late (as the result of physical damage from a covered risk, such as a fire), then it will be essential for the builder's risk insurers or brokers who price out the insurance to have a reasonable estimate of anticipated daily revenue and other financial factors. In a competitive bidding setting, and assuming that the Contractor will procure the builder's risk insurance (and include or account for the premium in the bid price), this means that such information will need to be furnished to bidders, who can then communicate it to brokers, who will furnish quotes for premiums.

As an alternative, Owner may prefer to solicit bids based on a generic requirement (such as that stated in SC-6.04.G), and then work with the selected Contractor and its insurer to refine the scope of loss of revenue and soft cost coverage and the related premiums, and issue a Change Order to document the precise coverage and any resulting change in Contract Price.

SC-6.04 Supplement Paragraph 6.04 of the General Conditions with the following provision:

G. *Coverage for Completion Delays:* The builder's risk policy will include, for the benefit of Owner, loss of revenue and soft cost coverage for losses arising from delays in completion that result from covered physical losses or damage. Such coverage will include, without limitation, fixed expenses and debt service for a minimum of 12 months with a maximum deductible of 30 days, compensation for loss of net revenues, rental costs, and attorneys' fees and engineering or other consultants' fees, if not otherwise covered.

Guidance Notes—Builder's Risk Deductibles—Paragraph 6.04.A of the General Conditions requires builder's risk insurance on a completed value basis, subject to such deductible amounts as are provided by the Supplementary Conditions. SC-6.04.H provides a means of identifying a primary deductible; other specific deductibles may also be added. It is common for builder's risk policies to feature several different deductibles, typically including a primary deductible and specific deductibles applicable to specific types of loss, such as flood and earth movement.

In some cases, the Owner (as the party directing or specifying the content of the insurance-related Supplementary Conditions) will choose not to specify any deductibles, leaving establishment of the deductible amounts to the discretion of the purchasing party, which is responsible for payment of the deductibles. Even when a deductible is stipulated, it is typically a maximum amount; the purchaser may choose to purchase a policy with a lower deductible.

The builder's risk policies available for projects in coastal and other high-risk areas may have special deductible provisions for wind and flood damage (hurricanes), earthquakes, and other specific risks. Such deductibles are determined based on a percentage of the property value at the time of loss, rather than being stated as a specific dollar amount. SC-6.04.H should be revised to reflect coastal or other local conditions that change the approach to deductibles.

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SC-6.04 Supplement Paragraph 6.04 of the General Conditions with the following provisions:

H. *Builder's Risk and Other Property Insurance Deductibles:* The purchaser of any required builder's risk, installation floater, or other property insurance will be responsible for costs not covered because of the application of a policy deductible.

1. The builder's risk policy (or if applicable the installation floater) will be subject to a deductible amount of no more than $**[number]** for direct physical loss in any one occurrence.

Guidance Notes—Installation Floater—An installation floater is insurance carried by a specific contractor, covering only the materials and equipment to be incorporated in the contractor's work. It typically does not insure against losses that occur after installation. In most cases, builder's risk insurance offers broader coverage, covers the Owner, Contractor, and Subcontractors, and is the preferred risk management instrument. On some projects, an installation floater may be an acceptable alternative to a builder's risk policy. For example, on a pipeline project it may be sufficient from a risk management standpoint to insure against loss or damage to the piping until installation, at which time there is little further risk from standard insurable perils such as fire or windstorm. Because the Owner will typically not be an insured, the use of an installation floater also assumes a risk management decision that protecting the Contractor's interest in the materials and equipment is sufficient to assure the best interests of the project. See EJCDC® C-001, Commentary on the 2018 EJCDC Construction Documents (2018).

If, after consultation with its risk managers, Owner elects to allow purchase of an installation floater rather than a builder's risk policy, the following SC-6.04.A should be included as a Supplementary Condition; GC-6.04.B, GC-6.04.C, GC-6.04.D, and GC-6.04.E should be retained; SC-6.04.F, Builder's Risk Requirements, should not be included; and SC-6.04.H, Builder's Risk and other Property Insurance Deductibles, should be included. Owner should determine whether soft cost and related coverage is available and warranted, and if so modify the contents of SC-6.04.G, Coverage for Completion Delays, for the installation floater requirement.

SC-6.04 Delete Paragraph 6.04.A of the General Conditions and substitute the following in its place:

A. *Installation Floater*

1. Contractor shall provide and maintain installation floater insurance on a broad form or "all risk" policy providing coverage for materials, supplies, machinery, fixtures, and equipment that will be incorporated into the Work ("Covered Property"). Coverage under the Contractor's installation floater will include loss from covered "all risk" causes (perils) to Covered Property:

a. of the Contractor, and Covered Property of others that is in Contractor's care, custody, and control;

b. while in transit to the Site, including while at temporary storage sites;

c. while at the Site awaiting and during installation, erection, and testing;

d. continuing at least until the installation or erection of the Covered Property is completed, and the Work into which it is incorporated is accepted by Owner.

2. The installation floater coverage cannot be contingent on an external cause or risk, or limited to property for which the Contractor is legally liable.

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3. The installation floater coverage will be in an amount sufficient to protect Contractor's interest in the Covered Property. The Contractor will be solely responsible for any deductible carried under this coverage.

4. This policy will include a waiver of subrogation applicable to Owner, Contractor, Engineer, all Subcontractors, and the officers, directors, partners, employees, agents and other consultants and subcontractors of any of them.

ARTICLE 7—CONTRACTOR'S RESPONSIBILITIES

7.03 *Labor; Working Hours*

Guidance Notes—Defining "Regular Hours" and "Legal Holidays"—Paragraph 7.03.C of the General Conditions restricts Contractor to working during "regular hours" Monday through Friday, and no work is permitted on "legal holidays." To provide details regarding the meaning of the terms "regular hours" and "legal holidays," consider specifically defining them by adding the following:

SC-7.03 Add the following new subparagraphs immediately after Paragraph 7.03.C:

1. Regular working hours will be **[Here insert schedule of regular working hours]**.

2. Owner's legal holidays are **[Here insert list of legal holidays]**.

Guidance Notes—Days of the Week That May be Worked—To modify the days of the week that Contractor may work, use the following:

SC-7.03 Amend the first and second sentences of Paragraph 7.03.C to state "…all Work at the Site must be performed during regular working hours, **[day of the week]** through **[day of the week]**. Contractor will not perform Work on a **[day of the week]**, **[day of the week]**, or any legal holiday."

Guidance Notes—Unlimited Work Schedule—If the Owner has no objections to the Contractor working multiple shifts, weekends, and legal holidays, use the following:

SC-7.03 Delete Paragraph 7.03.C in its entirety, and insert the following:

C. In the absence of any Laws or Regulations to the contrary, Contractor may perform the Work on holidays, during any or all hours of the day, and on any or all days of the week, at Contractor's sole discretion.

Guidance Notes—Responsibility for Overtime Costs—If Contractor is permitted to Work outside regular hours and on weekends and holidays, whether by a contractual provision or by Owner's consent during the course of the Project, then it is good practice to address the issue of whether Owner may charge Contractor for engineering expenses associated with the non-regular schedule. Some Owners may prefer to absorb these costs to incentivize (or at least facilitate) an aggressive schedule and timely completion; and in many cases the net additional expense may be modest. Other Owners may prefer to establish and

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collect a charge for the engineering services. Add the following as SC-7.03.D, making a policy choice regarding responsibility in the beginning of the sentence:

SC-7.03 Add the following new paragraph immediately after Paragraph 7.03.C:

D. **[Contractor] [Owner] [choose one and delete the other]** shall be responsible for the cost of any overtime pay or other expense incurred by the Owner for Engineer's services (including those of the Resident Project Representative, if any), Owner's representative, and construction observation services, occasioned by the performance of Work on Saturday, Sunday, any legal holiday, or as overtime on any regular work day. If Contractor is responsible but does not pay, or if the parties are unable to agree as to the amount owed, then Owner may impose a reasonable set-off against payments due under Article 15.

Guidance Notes—Defining Overtime Costs—If responsibility for costs in SC-7.03.D will be allocated to Contractor, Owner may wish to provide some specificity regarding the potential costs, through the addition of the following:

SC-7.03 Add the following new subparagraph immediately after Paragraph SC-7.03.D:

1. For purposes of administering the foregoing requirement, additional overtime costs are defined as **[Here insert parameters for compensated overtime hours]**.

7.10 *Taxes*

Guidance Notes—Sales and Use Tax Exemptions—If Owner qualifies for a state or local sales or use tax exemption in the purchase of certain materials and equipment, add the following Supplementary Condition, with any revisions necessary to meet the specific applicable exemption rules.

If instructions to bidders or proposers are used, confirm that the provisions here are consistent with the corresponding provisions in such instructions. See EJCDC® C-200, Instructions to Bidders for Construction Contracts (2018), Article 21.

SC-7.10 Add a new paragraph immediately after Paragraph 7.10.A:

B. Owner is exempt from payment of sales and compensating use taxes of the State of **[name of state where Project is located]** and of cities and counties thereof on all materials to be incorporated into the Work.

1. Owner will furnish the required certificates of tax exemption to Contractor for use in the purchase of supplies and materials to be incorporated into the Work.

2. Owner's exemption does not apply to construction tools, machinery, equipment, or other property purchased by or leased by Contractor, or to supplies or materials not incorporated into the Work.

7.13 *Safety and Protection*

Guidance Notes—Owner's Safety Programs—Some Owners have written safety programs with which construction contractors must comply. If such is the case, Paragraph 7.13.G of the General Conditions

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states that the safety program will be identified or included in the Supplementary Conditions or Specifications (and Paragraph 9.12.B requires Owner to provide a copy of such programs to Contractor).

If the identification of the Owner's safety programs will occur in the Supplementary Conditions, use the following SC-7.13. If there is a Specification section (typically in Division 01) that addresses the Owner's safety programs, then SC-7.13 is unnecessary, though it could be retained as a means of providing a cross-reference to the specific location in the Specifications.

SC-7.13 Insert the following after the second sentence of Paragraph 7.13.G:

The following Owner safety programs are applicable to the Work: **[Here expressly identify by title and/or date, any such Owner safety programs. If Owner's safety programs are included in or addressed in the Specifications, SC-7.13 may be used to provide a cross-reference to the Specification section]**.

ARTICLE 8—OTHER WORK AT THE SITE

8.02 *Coordination*

Guidance Notes—Coordinating Other Work at Site—Paragraph 8.02 of the General Conditions requires that if in addition to retaining Contractor, Owner will arrange to have others perform work at the Site, Owner must provide to Contractor specified information regarding coordination of construction activities. (Note that Owner should provide specific information about the other work—nature of the work, scope, schedule, exact location—elsewhere in the Contract Documents or in other documentation.) When applicable, add the following to provide such information:

SC-8.02 Add the following new Paragraph 8.02.C immediately after Paragraph 8.02.B:

C. Owner intends to contract with others for the performance of other work at or adjacent to the Site.

1. **[Here identify individual or entirety]** shall have authority and responsibility for coordination of the various contractors and work forces at the Site;
2. The following specific matters are to be covered by such authority and responsibility: **[Here itemize such matters]**;
3. The extent of such authority and responsibilities is: **[Here provide the extent]**.

ARTICLE 9—OWNER'S RESPONSIBILITIES

9.13 *Owner's Site Representative*

Guidance Notes—Owner's Site Representative—The EJCDC Construction series documents assume that the Engineer will be Owner's representative during construction. See EJCDC® C-520, Agreement Between Owner and Contractor for Construction Contract (Stipulated Price) (2018), Paragraph 3.01, and GC-10.01. On many projects the Engineer will carry out duties at the Site through a Resident Project Representative (RPR), as addressed in GC-10.03. When that is the case, SC-10.03.C and SC-10.03.D should be included, as modified for the specific Project.

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Paragraph 10.03.B of the General Conditions indicates that the Owner may designate a representative or agent who is not Engineer's consultant, agent, or employee, to represent Owner at the Site ("Owner's Site Representative"). In such case the Owner typically would not have the Engineer furnish a Resident Project Representative, and hence SC-10.03.B below would be used to indicate there is no Engineer's Resident Project Representative; and typically SC-9.13 would be used for the identification of the Owner's Site Representative.

Note that the following SC-9.13, if used, must be supplemented by customized text that explains the responsibilities of the Owner's Site Representative, so far as such are relevant to Contractor. The content of Paragraphs SC-10.03.C below may be a helpful starting point in drafting such supplemental text. In addition, if Owner's retention of an Owner's Site Representative will affect other aspects of Engineer's status during construction, other portions of Article 10 and many other parts of the General Conditions will need to be revised. In such cases it is typical for (and Laws and Regulations may require) the design engineer (as engineer of record) to at least retain a role with respect to design intent reviews of submittals and similar aspects of the Work.

SC-9.13 Add the following new paragraph immediately after Paragraph 9.12 of the General Conditions:

9.13 *Owner's Site Representative*

A. Owner will furnish an "Owner's Site Representative" to represent Owner at the Site and assist Owner in observing the progress and quality of the Work. The Owner's Site Representative is not Engineer's consultant, agent, or employee. Owner's Site Representative will be [**here identify individual or entity]**. The authority and responsibilities of Owner's Site Representative follow: **[Here describe the duties and activities of the Owner's Site Representative.]**

ARTICLE 10—ENGINEER'S STATUS DURING CONSTRUCTION

10.03 *Resident Project Representative*

Guidance Notes—Engineer's Resident Project Representative (RPR)—As indicated in Paragraph 10.03 of the General Conditions, in those cases in which the Engineer will provide a Resident Project Representative (RPR) during construction, the authority and responsibilities of the RPR with respect to the Contractor must be specified in the Supplementary Conditions. SC-10.03.C and SC-10.03.D, below, provide a mechanism for doing so.

In the alternative, in some cases Engineer will not provide RPR services, either because there will not be an RPR, or because a party other than Engineer will provide the site services. When such is the case, SC-10.03.A.1 below should be used.

As indicated in Paragraph 10.03 of the General Conditions, the Owner may designate a representative or agent who is not Engineer's consultant, agent, or employee, to represent Owner at the Site. In such case, in addition to using SC-10.03.A.1, below, refer to the Guidance Note in Article 9 and use SC-9.13 above.

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SC-10.03 Add the following new subparagraph immediately after Paragraph 10.03.A:

1. On this Project, by agreement with the Owner, the Engineer will not furnish a Resident Project Representative to represent Engineer at the Site or assist Engineer in observing the progress and quality of the Work.

Guidance Notes—RPR Services—As discussed, the most typical case is that the site representative is Engineer's consultant, agent, or employee, in which case SC-10.03.C and SC-10.03.D are mandatory. SC-10.03.C and SC-10.03.D focus on the role of the Resident Project Representative with respect to the Contractor. The RPR's scope of services and obligations to Owner are typically more extensive than the provisions here in the construction contract; they are spelled out in detail in Exhibit D to EJCDC® E-500, Agreement Between Owner and Engineer for Professional Services. The following should be edited to indicate the specific RPR authority and responsibilities that apply to this Contract.

SC-10.03 Add the following new paragraphs immediately after Paragraph 10.03.B:

C. The Resident Project Representative (RPR) will be Engineer's representative at the Site. RPR's dealings in matters pertaining to the Work in general will be with Engineer and Contractor. RPR's dealings with Subcontractors will only be through or with the full knowledge or approval of Contractor. The RPR will:

1. *Conferences and Meetings:* Attend meetings with Contractor, such as preconstruction conferences, progress meetings, job conferences, and other Project-related meetings (but not including Contractor's safety meetings), and as appropriate prepare and circulate copies of minutes thereof.

2. *Safety Compliance:* Comply with Site safety programs, as they apply to RPR, and if required to do so by such safety programs, receive safety training specifically related to RPR's own personal safety while at the Site.

3. *Liaison*

   a. Serve as Engineer's liaison with Contractor. Working principally through Contractor's authorized representative or designee, assist in providing information regarding the provisions and intent of the Contract Documents.

   b. Assist Engineer in serving as Owner's liaison with Contractor when Contractor's operations affect Owner's on-Site operations.

   c. Assist in obtaining from Owner additional details or information, when required for Contractor's proper execution of the Work.

4. *Review of Work; Defective Work*

   a. Conduct on-Site observations of the Work to assist Engineer in determining, to the extent set forth in Paragraph 10.02, if the Work is in general proceeding in accordance with the Contract Documents.

   b. Observe whether any Work in place appears to be defective.

   c. Observe whether any Work in place should be uncovered for observation, or requires special testing, inspection or approval.

5. *Inspections and Tests*

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a. Observe Contractor-arranged inspections required by Laws and Regulations, including but not limited to those performed by public or other agencies having jurisdiction over the Work.

b. Accompany visiting inspectors representing public or other agencies having jurisdiction over the Work.

6. *Payment Requests:* Review Applications for Payment with Contractor.

7. *Completion*

a. Participate in Engineer's visits regarding Substantial Completion.

b. Assist in the preparation of a punch list of items to be completed or corrected.

c. Participate in Engineer's visit to the Site in the company of Owner and Contractor regarding completion of the Work, and prepare a final punch list of items to be completed or corrected by Contractor.

d. Observe whether items on the final punch list have been completed or corrected.

D. The RPR will not:

1. Authorize any deviation from the Contract Documents or substitution of materials or equipment (including "or-equal" items).

2. Exceed limitations of Engineer's authority as set forth in the Contract Documents.

3. Undertake any of the responsibilities of Contractor, Subcontractors, or Suppliers.

4. Advise on, issue directions relative to, or assume control over any aspect of the means, methods, techniques, sequences or procedures of construction.

5 Advise on, issue directions regarding, or assume control over security or safety practices, precautions, and programs in connection with the activities or operations of Owner or Contractor.

6. Participate in specialized field or laboratory tests or inspections conducted off-site by others except as specifically authorized by Engineer.

7. Authorize Owner to occupy the Project in whole or in part.

ARTICLE 11—CHANGES TO THE CONTRACT

No suggested Supplementary Conditions in this Article.

ARTICLE 12—CLAIMS

No suggested Supplementary Conditions in this Article.

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

13.01 *Cost of the Work*

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Guidance Notes—Equipment Rental Costs—When Contractor's compensation is determined in whole or in part on the basis of Cost of the Work, equipment rental charges, particularly with respect to Contractor-owned equipment, can sometimes lead to disagreements. GC-13.01.B.5.c.(2) addresses Contractor owned equipment rental costs, indicating that such costs will be governed by a rental rate book specified in the Supplementary Conditions. The following Supplementary Condition is the location to specify the governing rental rate book. As of 2018, commonly used rental rate books include the Rental Rate Blue Book for Construction Equipment, and the AED Green Book: Rental Rates & Specifications for Construction Equipment.

SC-13.01 Supplement Paragraph 13.01.B.5.c.(2) by adding the following sentence:

The equipment rental rate book that governs the included costs for the rental of machinery and equipment owned by Contractor (or a related entity) under the Cost of the Work provisions of this Contract is the most current edition of **[name of equipment rental rate book]**.

Guidance Notes—Defining "Small Tools and Hand Tools"—GC-13.01.C.2 excludes the cost of "small tools and hand tools" from Cost of the Work. Providing more definition of what that term means in a Supplementary Condition may eliminate or reduce arguments about this aspect of Cost of the Work. One common approach is to define small tools and hand tools based on a price threshold, as follows:

SC-13.01 Supplement Paragraph 13.01.C.2 by adding the following definition of small tools and hand tools:

a. For purposes of this paragraph, "small tools and hand tools" means any tool or equipment whose current price if it were purchased new at retail would be less than $500. **[or insert other threshold price.]**

13.03 *Unit Price Work*

Guidance Notes—Variations from Estimated Quantities, Unit Price Work—GC-13.03.E is a "variation in estimated quantities (VEQ)" clause that applies when the actual quantity of a unit price item varies "materially and significantly" from the estimated quantity. The following Supplementary Condition is a more specific and detailed VEQ clause. By providing a specific threshold for eligible categories of unit prices, and specifically defining the degree by which an actual quantity must vary from the estimated quantity, the Supplementary Condition is intended to simplify and facilitate the administrative resolution of situations where actual quantities of unit price items differ materially and significantly from estimated quantities. When such a VEQ clause is used, a common number for the first blank is 5 percent of the Contract Price (based on estimated quantities), and a common number for the second blank is typically 15, 20, or 25 percent; however, other numbers may be appropriate in both locations.

SC-13.03 Delete Paragraph 13.03.E in its entirety and insert the following in its place:

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:

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a. the extended price of a particular item of Unit Price Work amounts to **[number]** percent or more of the Contract Price (based on estimated quantities at the time of Contract formation) and the variation in the quantity of that particular item of Unit Price Work actually furnished or performed by Contractor differs by more than **[number]** percent 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 ACCCEPTANCE OF DEFECTIVE WORK

No suggested Supplementary Conditions in this Article.

ARTICLE 15—PAYMENTS TO CONTRACTOR, SET OFFS; COMPLETIONS; CORRECTION PERIOD

15.01 *Progress Payments*

Guidance Notes—Coordinating Payments with Actual Progress of the Work—Paragraph GC-15.01.A states that progress payments for "cost-based Work will be based on Cost of the Work completed by Contractor during the pay period." This contractual provision generally will be sufficient to result in a fair and orderly payment process on cost-plus contracts. However, on some projects the cost-based progress payments may outpace the actual progress of the Work, or may become substantially out of step with respect to the ultimate limits created by a Guaranteed Maximum Price. The following clause may be added to Paragraph 15.01 to allow Owner to require Contractor to adjust its progress payment requests to bring the payment flow back into balance.

SC-15.01 Add the following new Paragraph 15.01.F:

F. For contracts in which the Contract Price is based on the Cost of Work, if Owner determines that progress payments made to date substantially exceed the actual progress of the Work (as measured by reference to the Schedule of Values), or present a potential conflict with the Guaranteed Maximum Price, then Owner may require that Contractor prepare and submit a plan for the remaining anticipated Applications for Payment that will bring payments and progress into closer alignment and take into account the Guaranteed Maximum Price (if any), through reductions in billings, increases in retainage, or other equitable measures. Owner will review the plan, discuss any necessary modifications, and implement the plan as modified for all remaining Applications for Payment.

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Guidance Notes—Modifying the Standard Time in Which Owner Must Make Payments— Paragraph GC-15.01.D states that Owner will pay Contractor within 10 days after receipt of Engineer's recommendation of payment of a progress payment; GC-15.06.E requires Owner to make the final payment within 30 days of the final Application for Payment. The user should confirm that these payment deadlines are acceptable to Owner. See EJCDC® C-050, Bidding Procedures and Construction Contract Documents (2018), Paragraph 5.06. If changes are appropriate, prepare Supplementary Conditions here in Article SC-15 to modify the number of days in which payments are due.

15.03 *Substantial Completion*

Guidance Notes—Owner Recovery of Re-inspection Costs—Paragraph 15.03.A of the General Conditions requires Contractor to give notice that the Work is substantially complete; Paragraph 15.03.B requires an inspection of the Work to determine whether Engineer agrees that the Work is substantially complete. If the Work is not substantially complete, and must be inspected again at a later point, then the following Supplementary Condition, if included in the Contract, would allow Owner to recover the cost of the re-inspection.

SC-15.03 Add the following new subparagraph to Paragraph 15.03.B:

1. If some or all of the Work has been determined not to be at a point of Substantial Completion and will require re-inspection or re-testing by Engineer, the cost of such re-inspection or re-testing, including the cost of time, travel and living expenses, will be paid by Contractor to Owner. If Contractor does not pay, or the parties are unable to agree as to the amount owed, then Owner may impose a reasonable set-off against payments due under this Article 15.

15.08 *Correction Period*

Guidance Notes—Lengthening the Correction Period—Paragraph 15.08.A of the General Conditions refers to a one-year correction period following Substantial Completion. During that one-year time period, Contractor is obligated to return to the Site to correct defective Work. If a longer correction period is to be imposed, use SC-15.08.G. Note that often the lengthening of the correction period will be tied to the use of a warranty bond. See SC-6.01.B. The extension of the correction period set forth in SC-6.01.B is confirmed in the following Supplementary Condition by reference. In that case the sentence may be terminated after "…years set forth in SC-6.01.B.1."

If the extension of the correction period is independent of a warranty bond or similar provision, then the user should accomplish the extension by filling in the number where indicated at the end SC-15.08.G.

If SC-15.08.G is not used, the correction period will retain the standard one year duration.

SC-15.08 Add the following new Paragraph 15.08.G:

G. The correction period specified as one year after the date of Substantial Completion in Paragraph 15.08.A of the General Conditions is hereby revised to be the number of years set forth in SC-6.01.B.1; or if no such revision has been made in SC-6.01.B, then the correction period is hereby specified to be **[number]** years after Substantial Completion.

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ARTICLE 16—SUSPENSION OF WORK AND TERMINATION

No suggested Supplementary Conditions in this Article.

ARTICLE 17—FINAL RESOLUTIONS OF DISPUTES

17.02 *Arbitration*

Guidance Notes—Alternatives to Litigation as Final Dispute Resolution Method; Arbitration— Paragraph 17.01.B of the General Conditions provides that for any dispute subject to final resolution under Article 17, Owner or Contractor may invoke the dispute resolution procedure called for in the Supplementary Conditions. Paragraph SC-17.02 is the location to identify any such primary dispute resolution procedure. If no procedure is identified here in the Supplementary Conditions, and the parties do not agree to a specific procedure, then the default resolution procedure will be litigation—the pursuit of rights in a court of competent jurisdiction. Note that before reaching the point of final resolution of disputes, in most cases the Owner and Contractor will already have engaged in the Claim process described in Article 12 of the General Conditions. That process allows for mediation of the dispute.

As an alternative to litigation, there are many other possible dispute resolution procedures, or combinations of procedures. One of the most common procedures for resolving construction disputes is arbitration; wording for an arbitration clause follows. A discussion of the pros and cons of the arbitration process (and there are many advocates on both sides) is beyond the scope of this Guide. Owner should consult with its legal counsel when considering the inclusion of an arbitration clause, or of any other dispute resolution procedure or combination of procedures.

The EJCDC arbitration clause is drafted to use the rules and administration of the American Arbitration Association. The user is free to substitute the rules and services of other dispute resolution organizations, and to customize the arbitration process to suit the needs of the specific Contract.

The arbitration option is as follows:

SC-17.02 Add the following new paragraph immediately after Paragraph 17.01.

17.02 *Arbitration*

A. All matters subject to final resolution under this Article will be settled by arbitration administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules (subject to the conditions and limitations of this Paragraph SC-17.02). Any controversy or claim in the amount of $100,000 or less will be settled in accordance with the American Arbitration Association's supplemental rules for Fixed Time and Cost Construction Arbitration. This agreement to arbitrate will be specifically enforceable under the prevailing law of any court having jurisdiction.

B. The demand for arbitration will be filed in writing with the other party to the Contract and with the selected arbitration administrator, and a copy will be sent to Engineer for information. The demand for arbitration will be made within the specific time required in Article 17, or if no specified time is applicable within a reasonable time after the matter in question has arisen, and in no event will any such demand be made after the date when institution of legal or equitable proceedings based on such matter in question would be barred by the applicable statute of limitations.

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C. The arbitrator(s) must be licensed engineers, contractors, attorneys, or construction managers. Hearings will take place pursuant to the standard procedures of the Construction Arbitration Rules that contemplate in-person hearings. The arbitrators will have no authority to award punitive or other damages not measured by the prevailing party's actual damages, except as may be required by statute or the Contract. Any award in an arbitration initiated under this clause will be limited to monetary damages and include no injunction or direction to any party other than the direction to pay a monetary amount.

D. The Arbitrators will have the authority to allocate the costs of the arbitration process among the parties, but will only have the authority to allocate attorneys' fees if a specific Law or Regulation or this Contract permits them to do so.

E. The award of the arbitrators must be accompanied by a reasoned written opinion and a concise breakdown of the award. The written opinion will cite the Contract provisions deemed applicable and relied on in making the award.

F. The parties agree that failure or refusal of a party to pay its required share of the deposits for arbitrator compensation or administrative charges will constitute a waiver by that party to present evidence or cross-examine witness. In such event, the other party shall be required to present evidence and legal argument as the arbitrator(s) may require for the making of an award. Such waiver will not allow for a default judgment against the non-paying party in the absence of evidence presented as provided for above.

G. No arbitration arising out of or relating to the Contract will include by consolidation, joinder, or in any other manner any other individual or entity (including Engineer, and Engineer's consultants and the officers, directors, partners, agents, employees or consultants of any of them) who is not a party to this Contract unless:

1. the inclusion of such other individual or entity will allow complete relief to be afforded among those who are already parties to the arbitration;

2. such other individual or entity is substantially involved in a question of law or fact which is common to those who are already parties to the arbitration, and which will arise in such proceedings;

3. such other individual or entity is subject to arbitration under a contract with either Owner or Contractor, or consents to being joined in the arbitration; and

4. the consolidation or joinder is in compliance with the arbitration administrator's procedural rules.

H. The award will be final. Judgment may be entered upon it in any court having jurisdiction thereof, and it will not be subject to modification or appeal, subject to provisions of the Laws and Regulations relating to vacating or modifying an arbitral award.

I. Except as may be required by Laws or Regulations, neither party nor an arbitrator may disclose the existence, content, or results of any arbitration hereunder without the prior written consent of both parties, with the exception of any disclosure required by Laws and Regulations or the Contract. To the extent any disclosure is allowed pursuant to the exception, the disclosure must be strictly and narrowly limited to maintain confidentiality to the extent possible.

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17.03 *Attorneys' Fees*

Guidance Notes—Prevailing Party Attorneys' Fees Clause—In most jurisdictions in the United States, as a general matter each party to a dispute is responsible for its own attorneys' fees, unless an express agreement provides to the contrary. Some legal authorities believe that this general rule encourages claims and disputes, because under the general rule claimants have little concern that they will be forced to pay for the opposing party's fees if the claim fails. Other authorities take the opposite view—that if a prevailing-party attorneys' fee rule is used instead of the general rule, then the enticing prospect of not only prevailing but also of having one's own fees paid by the opponent would encourage overly aggressive pursuit of claims (or overzealous defense against valid claims).

If an exception to the general United States rule is preferred for disputes subject to final resolution under Article 17, then add the following express agreement:

SC-17.03 Add the following new paragraph immediately after Paragraph 17.02. [Note: If there is no Paragraph 17.02, because neither arbitration nor any other dispute resolution process has been specified here in the Supplementary Conditions, then revise this to state "Add the following new Paragraph immediately after Paragraph 17.01" and revise the numbering accordingly].

17.03 *Attorneys' Fees*

A. For any matter subject to final resolution under this Article, the prevailing party shall be entitled to an award of its attorneys' fees incurred in the final resolution proceedings, in an equitable amount to be determined in the discretion of the court, arbitrator, arbitration panel, or other arbiter of the matter subject to final resolution, taking into account the parties' initial demand or defense positions in comparison with the final result.

ARTICLE 18—MISCELLANEOUS

18.08 *Assignment of Contract*

Guidance Notes—Assignment—GC-18.08 restricts the assignment of the Contract by both Owner and Contractor. From the Contractor's perspective, it has elected to work for a specific project Owner, based on an evaluation of the Owner's ability to meet its obligations (especially payment of Contractor), and on Owner's reputation for how it administers construction contracts. From Owner's perspective, it has awarded the Contract to a specific Contractor based in part on that Contractor's eligibility to perform the work with requisite competence, safety, and schedule compliance. GC-18.08 places some limitations on the ability of either party to transfer its duties without the consent of the other party.

If the parties anticipate during the drafting process that an assignment will occur (for example, a local sewer district that knows it soon will be transferring its infrastructure projects to a metropolitan authority), then a Supplementary Condition should be drafted to confirm the anticipated assignment and establish the parties' advance consent to the assignment, thereby avoiding possible disputes about granting consent.

Another possibility is an assignment of a contract or purchase order to the Contractor. This typically happens in the context of Owner's procurement of engineered equipment; if the procurement is in progress when the Contractor is selected, it may make sense to assign the procurement contract to the

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Contractor. SC-18.08.B may be used to implement such an assignment, and to establish the assignment's basic terms. SC-18.08.B is intended to be coordinated with the EJCDC Procurement Series (P-Series) documents.

The form to be attached as an exhibit to the Contract (meaning the construction contract of which these Supplementary Conditions are a part), as referred to in SC-18.08.B, is the Assignment of Contract; Consent to Assignment; and Acceptance of Assignment form that is attached to EJCDC® P-520, Agreement Between Buyer and Seller (2018).

SC-18.08 Add the following new paragraph immediately after Paragraph 18.08.A:

B. The contract dated **[date]** between Owner as "buyer" and **[identify seller]** as "seller" for procurement of goods and special services ("procurement contract") **[is hereby] [will be]** assigned to Contractor by Owner, and Contractor **[accepts] [will accept]** such assignment. A form documenting the assignment is attached as an exhibit to this Contract.

1. This assignment will occur on the **[Effective Date of the Contract]**, and will relieve the Owner as "buyer" from all further obligations and liabilities under the procurement contract.

2. Upon assignment, the "seller" will be a Subcontractor or Supplier of the Contractor, and Contractor will be responsible for seller's performance, acts, and omissions, as set forth in Paragraph 7.07 of the General Conditions just as Contractor is responsible for all other Subcontractors and Suppliers.

3. Notwithstanding this assignment, all performance guarantees and warranties required by the procurement contract will continue to run for the benefit of the Owner and, in addition, for the benefit of the Contractor.

4. Except as noted in the procurement contract, all rights, duties and obligations of Engineer to "buyer" and "seller" under the procurement contract will cease **[upon the assignment to Contractor]**.

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EXHIBIT A—SOFTWARE REQUIREMENTS FOR ELECTRONIC DOCUMENT EXCHANGE

Guidance Notes—Exhibit A—This exhibit is used with the Electronic Documents Protocol (EDP) presented in SC-2.06. If the Project-specific Supplementary Conditions do not include SC-2.06, then do not include Exhibit A. If Exhibit A is included, modify it to conform to Project-specific requirements.

Item	Electronic Documents	Transmittal Means	Data Format	Note (1)
a.1	General communications, transmittal covers, meeting notices and responses to general information requests for which there is no specific prescribed form.	Email	Email	
a.2	Meeting agendas, meeting minutes, RFI's and responses to RFI's, and Contract forms.	Email w/ Attachment	PDF	(2)
a.3	Contactors Submittals (Shop Drawings, "or equal" requests, substitution requests, documentation accompanying Sample submittals and other submittals) to Owner and Engineer, and Owner's and Engineer's responses to Contractor's Submittals, Shop Drawings, correspondence, and Applications for Payment.	Email w/ Attachment	PDF	
a.4	Correspondence; milestone and final version Submittals of reports, layouts, Drawings, maps, calculations and spreadsheets, Specifications, Drawings and other Submittals from Contractor to Owner or Engineer and for responses from Engineer and Owner to Contractor regarding Submittals.	Email w/ Attachment or LFE	PDF	
a.5	Layouts and drawings to be submitted to Owner for future use and modification.	Email w/ Attachment or LFE	DWG	
a.6	Correspondence, reports and Specifications to be submitted to Owner for future word processing use and modification.	Email w/ Attachment or LFE	DOC	
a.7	Spreadsheets and data to be submitted to Owner for future data processing use and modification.	Email w/ Attachment or LFE	EXC	
a.8	Database files and data to be submitted to Owner for future data processing use and modification.	Email w/ Attachment or LFE	DB	

Notes	
(1)	All exchanges and uses of transmitted data are subject to the appropriate provisions of Contract Documents.
(2)	Transmittal of written notices is governed by Paragraph 18.01 of the General Conditions.

Key	
Email	Standard Email formats (.htm, .rtf, or .txt). Do not use stationery formatting or other features that impair legibility of content on screen or in printed copies
LFE	Agreed upon Large File Exchange method (FTP, CD, DVD, hard drive)
PDF	Portable Document Format readable by Adobe® Acrobat Reader Version **[number]** or later
DWG	Autodesk® AutoCAD .dwg format Version **[number]**
DOC	Microsoft® Word .docx format Version **[number]**
EXC	Microsoft® Excel .xls or .xml format Version **[number]**
DB	Microsoft® Access .mdb format Version **[number]**

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EXHIBIT B—FORESEEABLE BAD WEATHER DAYS

Guidance Notes—Exhibit B—This exhibit is used with SC-4.05.C, which provides a definition of those "abnormal weather conditions" that result from excessive precipitation or extreme temperatures. If the Project-specific Supplementary Conditions do not include SC-4.05.C, then do not include Exhibit B. If Exhibit B is included, fill in the information in the table to establish the Project-specific number of foreseeable Bad Weather Days with respect to precipitation and temperature.

Month	Number of Foreseeable Bad Weather Days in Month Based on Precipitation as Rain Equivalent (inches) (1)	Ambient Outdoor Air Temperature (degrees F)	
		Number of Foreseeable Bad Weather Days in Month Based on Low Temperature (at 11:00 a.m.)	Number of Foreseeable Bad Weather Days in Month Based on High Temperature (at 3:00 p.m.)
January			
February			
March			
April			
May			
June			
July			
August			
September			
October			
November			
December			

Notes:

1. Two inches of sleet equal one inch of rain. Five inches of wet, heavy snow equal one inch of rain. Fifteen inches of "dry" powder snow equals one inch of rain.

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EXHIBIT C—GEOTECHNICAL BASELINE REPORT SUPPLEMENT TO THE SUPPLEMENTARY CONDITIONS

Guidance Notes—Geotechnical Baseline Reports—This supplement presents optional Supplementary Conditions that are used if Owner elects to issue a Geotechnical Baseline Report (GBR) for a specific Project. Do not include this supplement with a project's Supplementary Conditions unless the GBR system is used.

Some project owners use a Geotechnical Baseline Report (GBR) for projects (or portions of a project) in which the subsurface conditions will play a significant role. Providing a GBR may result in bids with lower contingencies for subsurface conditions, and simplify the application of the differing site conditions provisions in Article 5 of the General Conditions. Commentary on Geotechnical Baseline Reports is presented in C-001. See also *Geotechnical Baseline Reports for Construction—Suggested Guidelines*, by Randall J. Essex, P.E., ASCE 2007. In many cases it may be advantageous for Owner, Engineer, or the geotechnical engineer to engage a consultant with GBR experience to assist in preparation of the GBR and related documents.

On projects in which a Geotechnical Baseline Report is used, it is typical to also assemble and provide a Geotechnical Data Report (GDR), as a separate, single source of factual geotechnical information regarding the Site. The content of the GDR is in essence what the EJCDC documents define as "Technical Data"—reliable factual information, such as boring logs and laboratory test results. (See the definition of Technical Data in Article 1 of the General Conditions, and the definition of a GDR in Article 1 of these Supplementary Conditions). Some Owners may elect to issue a GBR without compiling a GDR, but regardless of the format it is essential to identify and make all geotechnical data available. Note that a typical general-purpose geotechnical report, usually prepared primarily to assist in the design of the project, often contains not only factual data but also opinions, interpretations, and even speculation regarding the Site's subsurface conditions. Such a geotechnical report is not suitable to be adopted or identified as a GDR.

Although it is preferable that a GBR be comprehensive with respect to subsurface conditions, in some cases a GBR will establish baselines for a portion of a project, but will not address all subsurface issues. For example, the GBR may establish baseline subsurface conditions along the route of a pipeline, but be silent with respect to conditions underlying an associated pump building. Also, in some cases a project will involve both subsurface construction as well as building modifications or other tasks unrelated to geotechnical investigations, analysis, or interpretations. The SC/GBR provisions that follow retain certain differing site condition provisions of the General Conditions, in part because these may be needed for situations that are outside the scope of the GBR. As noted previously, these SC/GBR provisions contain locations for (1) identifying known reports and drawings regarding the subsurface conditions (a mandatory obligation), and (2) identifying Technical Data upon whose accuracy Contractor may rely (necessary in some but not all GBR projects, depending on the scope of the GBR and GDR documents).

If a GBR is used, it remains important to disclose known reports and tests regarding subsurface conditions; a place for doing so is provided in SC/GBR 5.03. If some Site conditions are outside the scope of the Geotechnical Baseline Report it will continue to be necessary to identify reliable Technical Data contained in such reports and drawings; however, if the Geotechnical Baseline Report or a related Geotechnical Data Report already establish the data that is worthy of reliance, it will not be necessary to make a redundant identification in SC/GBR 5.03.

If a GBR is used, then include the following GBR Supplementary Conditions, and do not use the Paragraph SC-5.03 in the main body of C-800:

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1.01 *Definitions*

SC-1.01 Add to the list of definitions in Paragraph 1.01.A by inserting the following as numbered items in their proper alphabetical positions:

1. *Geotechnical Baseline Report (GBR)*—The interpretive report prepared by or for Owner regarding subsurface conditions at the Site, and containing specific baseline geotechnical conditions that may be anticipated or relied upon for bidding and contract administration purposes, subject to the controlling provisions of the Contract, including the GBR's own terms. The GBR is a Contract Document.

2. *Geotechnical Data Report (GDR)*—The factual report that collects and presents data regarding actual subsurface conditions at or adjacent to the Site, including Technical Data and other geotechnical data, prepared by or for Owner in support of the Geotechnical Baseline Report. The GDR's content may include logs of borings, trenches, and other site investigations, recorded measurements of subsurface water levels, the results of field and laboratory testing, and descriptions of the investigative and testing programs. The GDR does not include an interpretation of the data. If opinions, or interpretive or speculative non-factual comments or statements appear in a document that is labeled a GDR, such opinions, comments, or statements are not operative parts of the GDR and do not have contractual standing. Subject to that exception, the GDR is a Contract Document.

5.03 *Subsurface and Physical Conditions*

SC-5.03 Delete Paragraph 5.03 in its entirety and replace with the following:

5.03 *Subsurface and Physical Conditions*

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

1. those reports of explorations and tests of subsurface conditions at or adjacent to the Site (other than any Geotechnical Data Report or Geotechnical Baseline Report) that contain Technical Data. Such reports are as follows:

   a. *Report Title:* **[Exact title of the document]**

   b. *Date of Report:* **[Date report was issued]**

   c. *Technical Data in report upon which Contractor may rely*: **[Identify Technical Data (for example, "Boring Log, Test Site 3") and specify page number or other reference where Technical Data is located within the report. List multiple Technical Data line items per entry when appropriate.]**

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. Such drawings are as follows:

   a. *Drawings Title:* **[Exact title of the drawings]**

   b. *Date of Drawings:* **[Date drawings were issued]**

   c. *Technical Data in drawings upon which Contractor may rely:* **[Identify Technical Data (for example, "Plan View of Rock Outcroppings") in drawings, or state "All**

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information in drawing" if entire content is Technical Data entitled to reliance; and specify drawing number, page number, or other reference where the Technical Data is located. List multiple Technical Data line items per entry when appropriate.]

3. Contractor may examine copies of reports and drawings identified immediately above that were not included with the Bidding Documents at **[location]** during regular business hours, or may request copies from Engineer, at the cost of reproduction.

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 SC-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 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 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; or

2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or

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.

E. *Geotechnical Baseline Report*

1. This Contract contains a Geotechnical Baseline Report ("GBR"), identified as follows: **[Example: Geotechnical Baseline Report for Northwest Interceptor, dated February 12, 2013, prepared by ABC Geotechnical Engineers, Inc., Sacramento, California]**. This Contract also contains a Geotechnical Data Report (GDR), identified as follows: **[Example: Geotechnical Data Report for Northwest Interceptor, dated June 15, 2012, prepared by ABC Geotechnical Engineers, Inc., Sacramento, California]**.

2. The GBR and GDR are incorporated as Contract Documents. The GBR and GDR are to be used in conjunction with other Contract Documents, including the Drawings and Specifications. If there is a conflict between the terms of the GBR and the GDR, the GBR's terms prevail.

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3. The GBR describes certain select subsurface conditions that are anticipated to be encountered by Contractor during construction in specified locations (referred to here in the Supplementary Conditions as "Baseline Conditions"). These may include ground, geological, groundwater, and other subsurface geotechnical conditions, and baselines of anticipated Underground Facilities or subsurface structures.

4. The Baseline Conditions will be used to assist in the administration of the Contract's differing site conditions clause at locations where subsurface conditions have been baselined. If a condition is baselined in the GBR, then only the pertinent Baseline Conditions will be used to determine whether there is a differing site condition; and no other indication of that condition in the Contract Documents or Technical Data, or of a condition that describes, quantifies, or measures a similar characteristic of the subsurface, will be used for the differing site condition determination.

5. The Baseline Conditions will not be used to make differing site conditions determinations at locations that have not been baselined in the GBR, or at any location with respect to subsurface conditions that the Baseline Conditions do not address. If Underground Facilities or Hazardous Environmental Conditions are expressly addressed in the Baseline Conditions, then comparison to such Baseline Conditions will be the primary means of determining (a) whether an Underground Facility was shown or indicated with reasonable accuracy, as provided in Paragraph 5.05 of the General Conditions, or (b) whether a Hazardous Environmental Condition was shown or indicated in the Contract Documents as indicated in Paragraph 5.06.H of the General Conditions. As indicated in Paragraph SC-5.04 below, the GDR will be the primary resource for differing site conditions determinations in cases in which the GBR is inapplicable.

6. The descriptions of subsurface conditions provided in the GBR are based on geotechnical investigations, laboratory tests, interpretation, interpolation, extrapolation, and analyses. Neither Owner, Engineer, nor any geotechnical or other consultant warrants or guarantees that actual subsurface conditions will be as described in the GBR, nor is the GBR intended to warrant or guarantee the use of specific means or methods of construction.

7. The behavior of the ground during construction depends substantially upon the Contractor's selected means, methods, techniques, sequences, and procedures of construction. If ground behavior conditions are baselined in the GBR, they are based on stated assumptions regarding construction means and methods.

8. The GBR will not reduce or relieve Contractor of its responsibility for the planning, selection, and implementation of safety precautions and programs incident to Contractor's means, methods, techniques, sequences, and procedures of construction, or to the Work.

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5.04 *Differing Subsurface or Physical Conditions*

SC-5.04 Delete Paragraph 5.04 in its entirety and replace with the following:

5.04 *Differing Subsurface or Physical Conditions*

A. *Notice:* If Contractor believes that any subsurface condition that is uncovered or revealed at the Site:

1. differs materially from conditions shown or indicated in the GBR; or

2. differs materially from conditions shown or indicated in the GDR, to the extent the GBR is inapplicable; or

3. differs materially from conditions shown or indicated in Contract Documents other than the GBR or GDR, to the extent the GBR and GDR are inapplicable; or

4. to the extent the GBR and GDR are inapplicable, 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; or

5. to the extent the GBR and GDR are inapplicable, is of such a nature as to require a change in the Drawings or Specifications; or

6. to the extent the GBR and GDR are inapplicable, 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 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 the necessity of Owner's obtaining 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 SC-5.04.A above; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption or continuation 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 or continuation 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.

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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 SC-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 of the General Conditions; 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; or

    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 as required by Paragraph SC-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 must 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 of the General Conditions governs rights and responsibilities regarding the presence or location of Underground Facilities. Paragraph 5.06 of the General Conditions governs rights and responsibilities regarding Hazardous Environmental Conditions. The provisions of

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Paragraphs SC-5.03 and SC-5.04 are not applicable to the presence or location of Underground Facilities, or to Hazardous Environmental Conditions.

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SECTION 00 85 00
STATE OF CONNECTICUT PREVAILING WAGE RATES

PART 1 - GENERAL

1.01 GENERAL

A. State Wage Rates, bound herein shall be considered the body of this Section.
   1. See attached sheets.

B. It is the responsibility of the Contractor before Bid opening to request, if necessary, any additional information on State Wage Rates for those tradespeople who are not covered by the applicable State Wage Determination but who may be employed for the proposed work under this Contract.

1.02 GENERAL

A. Wage Rates
   1. Minimum Rates and Classifications – Putnam, CT

B. Downloads for CT DOL web page. The following attachments are not considered to be all inclusive but are listed and provided for the Contractor's convenience.
   1. Statute Sec. 31-53b. Construction safety and health course
      a. Informational Bulletin. The 10-Hour OSHA Construction Safety and Health Course.
   2. Notice to All Mason Contractors
   3. Statute 31-55a Special Notice
   4. Notice to all Contracting Agencies - Certification Form
   5. Contractors Wage Certification Form
   6. Payroll Certification Forms
   7. Informational Bulletin – Occupational Classifications
   8. Footnotes

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

See attached sheets.

Minimum Rates and Classifications
for Building Construction

ID#: 26-9853

Connecticut Department of Labor
Wage and Workplace Standards Division

By virtue of the authority vested in the Labor Commissioner under provisions of Section 31-53 of the General Statutes of Connecticut, as amended, the following are declared to be the prevailing rates and welfare payments and will apply only where the contract is advertised for bid within 20 days of the date on which the rates are established. Any contractor or subcontractor not obligated by agreement to pay to the welfare and pension fund shall pay this amount to each employee as part of his/her hourly wages.

Project Number: 1998386.P91 Project Town: Putnam
State#: FAP#:
Project: Sludge Handling Improvements

CLASSIFICATION	Hourly Rate	Benefits
1b) Asbestos/Toxic Waste Removal Laborers: Asbestos removal and encapsulation (except its removal from mechanical systems which are not to be scrapped), toxic waste removers, blasters.**See Laborers Group 7**		
1c) Asbestos Worker/Heat and Frost Insulator	50.16	35.30
2) Boilermaker	50.21	30.01
3a) Bricklayer, Cement Mason, Concrete Finisher (including caulking), Stone Masons	45.76	37.42 + a
3b) Tile Setter	43.0	34.75
3c) Tile and Stone Finishers	36.0	29.43
3d) Marble & Terrazzo Finishers	35.7	29.73
3e) Plasterer	44.52	29.63

As of: September 4, 2026

3f) Terrazzo Mechanics & Marble Setters	40.6	39.93
------LABORERS------		
4) Group 1: General laborers, carpenter tenders, concrete specialists, wrecking laborers and fire watchers.	37.0	30.47
4) Group 1a: Acetylene Burners (Hours worked with a torch)	38.0	30.47
4a) Group 2: Mortar mixers, plaster tender, power buggy operators, powdermen, fireproofer/mixer/nozzleman (Person running mixer and spraying fireproof only).	37.25	30.47
4b) Group 3: Jackhammer operators/pavement breaker, mason tender (brick), mason tender (cement/concrete), forklift operators and forklift operators (masonry).	37.5	30.47
4c) **Group 4: Pipelayers: Licensed P6 -P7 (one or two employees of the total crew who primary task is to perform mating of pipe sections).	38.0	30.47
4d) Group 5: Air track operator, sand blaster and hydraulic drills.	37.75	30.47
4e) Group 6: Blasters, nuclear and toxic waste removal.	40.0	30.47
4f) Group 7: Asbestos/lead removal and encapsulation (except it's removal from mechanical systems which are not to be scrapped).	40.0	30.47
4g) Group 8: Bottom men on open air caisson, cylindrical work and boring crew.	37.5	30.47
4h) Group 9: Top men on open air caisson, cylindrical work and boring crew.	37.0	30.47

4i) Group 10: Traffic Control Signalman	22.2	30.47
4j) Group 11: Toxic Waste Removers A or B With PPE	40.0	30.47
5) Carpenter, Acoustical Ceiling Installation, Soft Floor/Carpet Laying, Metal Stud Installation, Form Work and Scaffold Building, Drywall Hanging, Modular-Furniture Systems Installers, Lathers, Piledrivers, Resilient Floor Layers.	44.48	29.74
5a) Millwrights	45.14	30.24
5b) Carpenter - Welder	44.98	29.74
5c) Carpenter: Working with creosote lumber or acid	45.48	29.74
6) Electrical Worker (including low voltage wiring) (Trade License required: E1,2 L-5,6 C-5,6 T-1,2 L-1,2 V-1,2,7,8,9)	50.25	37.47+3% of gross wage
7a) Elevator Mechanic (Trade License required: R-1,2,5,6)	69.55	38.985+a+b
-----OUTSIDE LINE CONSTRUCTION----		
Groundman	32.1	13.95
Linemen/Cable Splicer	58.37	33.94
8) Glazier (Trade License required: FG-1,2)	44.73	27.65+ a

9) Ironworker, Ornamental, Reinforcing, Structural, and Precast Concrete Erection	45.25	46.62 + a
----OPERATORS----		
Group 1: Crane Handling or Erecting Structural Steel or Stone, Hoisting Engineer (2 drums or over), Deep Shaft over 14". (Trade License Required)	60.66	30.95 + a
Group 1a: Front End Loader (7 cubic yards or over); Work Boat 26 ft. and Over	55.6	30.95 + a
Group 2: Cranes (100 ton rate capacity and over). (Trade License Required)	60.24	30.95 + a
Group 2a: Cranes (under 100 ton rated capacity), Magni Type-360 Rotating Forklift.	59.2	30.95 + a
Group 2b: Excavator over 2 cubic yards; Pile Driver ($3.00 premium when operator controls hammer), HF-1 Forklift, Drills with self contained power units, Micropile up to 14 inches helical pile.	55.17	30.95 + a
Group 3: Excavator; Gradall; Master Mechanic; Hoisting Engineer (all types of equipment where a drum and cable are used to hoist or drag material regardless of motive power of operation), Rubber Tire Excavator (Drott-1085 or similar);Grader Operator; Bulldozer Finegrade. (slopes, shaping, laser or GPS, etc.). (Trade License Required)	54.13	30.95 + a
Group 4: Trenching Machines; Lighter Derrick; CMI Machine or Similar; Koehring Loader (Skooper); Goldhofer.	53.61	30.95 + a
Group 5: Specialty Railroad Equipment; Asphalt Spreader, Asphalt Reclaiming Machine; Line Grinder; Concrete Pumps; Drills with Self Contained Power Units; Boring Machine; Post Hole Digger; Auger; Pounder; Well Digger; Milling Machine (over 24 mandrel).	52.78	30.95 + a
Group 5 continued: Side Boom; Combination Hoe and Loader; Directional Driller, Geothermal Drill.	52.78	30.95 + a

Group 6: Front End Loader (3 up to 7 cubic yards); Bulldozer (rough grade dozer).	52.35	30.95 + a
Group 7: Asphalt Roller; Concrete Saws and Cutters (ride on types); Vermeer Concrete Cutter; Stump Grinder; Scraper; Snooper; Skidder; Milling Machine (24" and under mandrel).	51.89	30.95 + a
Group 8: Mechanic; Grease Truck Operator; Hydroblaster; Barrier Mover; Power Stone Spreader; Welding; Work Boat Under 26 ft.; Transfer Machine; Rigger Foreman.	51.34	30.95 + a
Group 9: Front End Loader (under 3 cubic yards); Skid Steer Loader regardless of attachments; (Bobcat or Similar); Forklift, Power Chipper; Landscape Equipment (including Hydroseeder); Vacuum Excavation Truck and Hydrovac Excavation Truck (27 HG pressure or greater).	50.74	30.95 + a
Group 10: Vibratory hammer; ice machine; diesel and air, hammer, etc.	47.91	30.95 + a
Group 11: Conveyor, earth roller, power pavement breaker (whiphammer), robot demolition equipment.	47.91	30.95 + a
Group 12: Wellpoint Operator.	47.82	30.95 + a
Group 13: Compressor Battery Operator.	47.04	30.95 + a
Group 14: Elevator Operator; Tow Motor Operator (solid tire no rough terrain).	45.45	30.95 + a
Group 15: Generator Operator; Compressor Operator; Pump Operator; Welding Machine Operator; Heater Operator.	44.89	30.95 + a
Group 16: Maintenance Engineer and Articulating End Dump.	43.99	30.95 + a

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Group 17: Portable Asphalt Plant Operator; Portable Crusher Plant Operator; Portable Concrete Plant Operator; Portable Grout Plant Operator; Portable Water Filtration Plant Operator.	49.95	30.95 + a
Group 18: Power Safety Boat; Vacuum Truck; Zim Mixer; Sweeper; (Minimum for any job requiring a CDL license); Rigger; Signalman.	46.6	30.95 + a
Surveyor: Chief of Party	50.21	30.95 + a
Surveyor: Assistant Chief of Party	46.3	30.95 + a
Surveyor: Instrument Man	44.55	30.95 + a
Surveyor: Rodman or Chainman	38.34	30.95 + a
------PAINTERS (Including Drywall Finishing)------		
10a) Brush and Roller	41.17	27.65
10b) Taping Only/Drywall Finishing	41.92	27.65
10c) Paperhanger and Red Label	41.67	27.65
10d) Spray	44.17	27.65
10e) Spray Helper	42.17	27.65
10f) Blast	46.17	27.65

10g) Blast Helper	42.17	27.65
11) Plumber (excluding HVAC pipe installation) (Trade License required: P-1,2,6,7,8,9 J-1,2,3,4 SP-1,2)	52.08	36.80
12) Well Digger, Pile Testing Machine	37.26	24.05 + a
13) Roofer (composition)	45.85	23.99
14) Roofer (slate & tile)	46.35	23.99
15) Sheetmetal Worker (Trade License required for HVAC and Ductwork: SM-1,SM-2,SM-3,SM-4,SM-5,SM-6)	46.53	45.08
16) Pipefitter (Including HVAC work) (Trade License required: S-1,2,3,4,5,6,7,8 B-1,2,3,4 D-1,2,3,4, G-1, G-2, G-8 & G-9)	52.08	36.80
------TRUCK DRIVERS------		
17) Block Truck	39.98	33.00 + a
17a) 2 Axle	38.66	33.00 + a
17ab) Helpers	36.16	33.00 + a
17b) 3 Axle, 2 Axle Mixer	38.77	33.00 + a
17c) 3 Axle Mixer	38.83	33.00 + a

17d) 4 Axle	38.89	33.00 + a
17e) 4 Axle Mixer	40.69	33.00 + a
17ef) 5 Axle	38.89	33.00 + a
17eg) 5 Axle Mixer	40.69	33.00 + a
17f) Heavy Duty Trailer (40 Tons and Over)	41.16	33.00 + a
17g) Euclids and Semi-Trailer	38.94	33.00 + a
17h) Heavy Duty Trailer up to 40 tons	39.89	33.00 + a
17i) Snorkle Truck	39.04	33.00 + a
17j) Swivel Dump and Tack Truck	38.89	33.00 + a
18) Sprinkler Fitter (Trade License required: F-1,2,3,4)	56.78	35.24 + a
19) Theatrical Stage Journeyman	25.76	7.34

Welders: Rate for craft to which welding is incidental.
Surveyors: Hazardous material removal: $3.00 per hour premium.
*Note: Hazardous waste removal work receives additional $1.25 per hour for truck drivers.
**Note: Hazardous waste premium $3.00 per hour over classified rate.
Truck Drivers: Trainers Premium: $3.00 over wage rate.
Truck Drivers: Night Premium - Mixer Drivers: $2.00 over wage rate.

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Crane with 150 ft. boom (including jib) - $1.50 extra
Crane with 200 ft. boom (including jib) - $2.50 extra
Crane with 250 ft. boom (including jib) - $5.00 extra
Crane with 300 ft. boom (including jib) - $7.00 extra
Crane with 400 ft. boom (including jib) - $10.00 extra

All classifications that indicate a percentage of the fringe benefits must be calculated at the percentage rate times the "base hourly rate".

Apprentices duly registered under the Commissioner of Labor's regulations on "Work Training Standards for Apprenticeship and Training Programs" Section 31-51-d-1 to 12, are allowed to be paid the appropriate percentage of the prevailing journeymen hourly base and the full fringe benefit rate, providing the work site ratio shall not be less than one full-time journeyperson instructing and supervising the work of each apprentice in a specific trade.

The Prevailing wage rates applicable to this project are subject to annual adjustments each July 1st for the duration of the project.
Each contractor shall pay the annual adjusted prevailing wage rate that is in effect each July 1st, as posted by the Department of Labor.
It is the contractor's responsibility to obtain the annual adjusted prevailing wage rate increases directly from the Department of Labor's website.
The annual adjustments will be posted on the Department of Labor's Web page: www.ct.gov/dol. For those without internet access, please contact the division listed below.
The Department of Labor will continue to issue the initial prevailing wage rate schedule to the Contracting Agency for the project.
All subsequent annual adjustments will be posted on our Web Site for contractor access.
Contracting Agencies are under no obligation pursuant to State labor law to pay any increase due to the annual adjustment provision.

Effective October 1, 2005 - Public Act 05-50: any person performing the work of any mechanic, laborer, or worker shall be paid prevailing wage

All Person who perform work ON SITE must be paid prevailing wage for the appropriate mechanic, laborer, or worker classification.

All certified payrolls must list the hours worked and wages paid to All Persons who perform work ON SITE regardless of their ownership i.e.: (Owners, Corporate Officers, LLC Members, Independent Contractors, et. al)

Reporting and payment of wages is required regardless of any contractual relationship alleged to exist between the contractor and such person.

~~Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clause (29 CFR 5.5 (a) (1) (ii)).

Please direct any questions which you may have pertaining to classification of work and payment of prevailing wages to the Wage and Workplace Standards Division, telephone (860)263-6790.

As of: September 4, 2026

Minimum Rates and Classifications for
Heavy/Highway Construction

ID#: 26-9853

Connecticut Department of Labor
Wage and Workplace Standards Division

By virtue of the authority vested in the Labor Commissioner under provisions of Section 31-53 of the General Statutes of Connecticut, as amended, the following are declared to be the prevailing rates and welfare payments and will apply only where the contract is advertised for bid within 20 days of the date on which the rates are established. Any contractor or subcontractor not obligated by agreement to pay to the welfare and pension fund shall pay this amount to each employee as part of his/her hourly wages.

Project Number: 1998386.P91 Project Town: Putnam
State#: FAP#:
Project: Sludge Handling Improvements

CLASSIFICATION	Hourly Rate	Benefits
1) Boilermaker	50.21	30.01
1a) Bricklayer, Cement Masons, Cement Finishers, Plasterers, Stone Masons	46.09	36.29
2) Carpenters, Piledrivermen	44.48	29.74
2a) Diver Tenders	44.48	29.74
2b) Divers Effluent	67.52	29.74
3) Divers	52.94	29.74
03a) Millwrights	45.14	30.24
03b) Carpenter-Welder	44.98	29.74
03c) Carpenter: Working with creosote lumber or acid	45.48	29.74

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4) Painters: (Bridge Construction) Brush, Roller, Blasting (Sand, Water, etc.), Spray	61.85	27.65
4a) Painters: Brush and Roller	41.17	27.65
4b) Painters: Spray	44.17	27.65
4bc) Painters: Spray Helper	42.17	27.65
4c) Painters: Steel Only	43.17	27.65
4d) Painters: Blast	46.17	27.65
4de) Painter: Blast Helper	42.17	27.65
4e) Painters: Tanks, Tower and Swingstage etc.	43.17	27.65
4f) Elevated Tanks (60 feet and above)	50.17	27.65
5) Electrician (Trade License required: E-1,2 L-5,6 C-5,6 T-1,2 L-1,2 V-1,2,7,8,9)	50.25	37.47+3% of gross wage
6) Ironworkers: Ornamental, Reinforcing, Structural, and Precast Concrete Erection	45.25	46.62 + a
7) Plumbers (Trade License required: (P-1,2,6,7,8,9 J-1,2,3,4 SP-1,2) and Pipefitters (Including HVAC Work) (Trade License required: S-1,2,3,4,5,6,7,8 B-1,2,3,4 D-1,2,3,4 G-1, G-2, G-8, G-9)	52.08	36.80
----LABORERS---- -		
8) Group 1: General Laborers and concrete specialist	37.0	30.47

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8) Group 1a: Acetylene Burners (Hours worked with a torch)	38.0	30.47
9) Group 2: Chain saw operators, fence and guard rail erectors, pneumatic tool operators, powdermen	37.25	30.47
10) Group 3: Pipelayers	37.5	30.47
11) Group 4: Jackhammer/Pavement breaker (handheld); mason tenders (cement/concrete), catch basin builders, asphalt rakers, air track operators, block paver, curb setter and forklift operators	37.5	30.47
12) Group 5: Toxic waste removal (non-mechanical systems)	39.0	30.47
13) Group 6: Blasters	38.75	30.47
Group 7: Asbestos/lead removal, non-mechanical systems (does not include leaded joint pipe)	40.0	30.47
Group 8: Traffic control signalmen	22.2	30.47
Group 9: Hydraulic Drills	37.75	30.47
Group 10: Toxic Waste Removers A or B With PPE	40.0	30.47
----LABORERS (TUNNEL CONSTRUCTION, FREE AIR). Shield Drive and Liner Plate Tunnels in Free Air.----		
13a) Miners, Motormen, Mucking Machine Operators, Nozzle Men, Grout Men, Shaft & Tunnel Steel & Rodmen, Shield & Erector, Arm Operator, Cable Tenders	39.23	30.47 + a
13b) Brakemen, Trackmen, Miners' Helpers and all other men	38.26	30.47 + a

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----CLEANING, CONCRETE AND CAULKING TUNNEL----		
14) Concrete Workers, Form Movers, and Strippers	38.26	30.47 + a
15) Form Erectors	38.59	30.47 + a
----ROCK SHAFT LINING, CONCRETE, LINING OF SAME AND TUNNEL IN FREE AIR:----		
16) Brakemen, Trackmen, Tunnel Laborers, Shaft Laborers, Miners Helpers	38.26	30.47 + a
17) Laborers Topside, Cage Tenders, Bellman	38.15	30.47 + a
18) Miners	39.23	30.47 + a
----TUNNELS, CAISSON AND CYLINDER WORK IN COMPRESSED AIR: ----		
18a) Blaster	45.72	30.47 + a
19) Brakemen, Trackmen, Groutman, Laborers, Outside Lock Tender, Gauge Tenders	45.52	30.47 + a
20) Change House Attendants, Powder Watchmen, Top on Iron Bolts	43.54	30.47 + a
21) Mucking Machine Operator, Grout Boss, Track Boss	46.31	30.47 + a
----TRUCK DRIVERS----(*see note below)		
Block Truck	39.98	33.00 + a

2 Axle	38.66	33.00 + a
Helpers	36.16	33.00 + a
Three Axle Trucks; Two Axle Mixer	38.77	33.00 + a
Three Axle Mixer	38.83	33.00 + a
Four Axle	38.89	33.00 + a
Four Axle Mixer	40.69	33.00 + a
5 Axle	38.89	33.00 + a
5 Axle Mixer	40.69	33.00 + a
Heavy Duty Trailer (40 tons and over)	41.16	33.00 + a
Heavy Duty Trailer (up to 40 tons)	39.89	33.00 + a
Snorkle Truck	39.04	33.00 + a
Swivel Dump and Tack Truck	38.89	33.00 + a
Euclids and Semi Trailer	38.94	33.00 + a

----POWER EQUIPMENT OPERATORS----

Group 1: Crane Handling or Erecting Structural Steel or Stone, Hoisting Engineer (2 drums or over), Caisson Drilled Shaft over 14". (Trade License Required)	60.66	30.95 + a
Group 1a: Front End Loader (7 cubic yards or over); Work Boat 26 ft. and over.	55.6	30.95 + a
Group 2: Cranes (100 ton rate capacity and over). (Trade License Required)	60.24	30.95 + a
Group 2a: Cranes (under 100 ton rated capacity), Magni Type-360 Rotating Forklift.	59.2	30.95 + a
Group 2b: Excavator over 2 cubic yards; Pile Driver ($3.00 premium when operator controls hammer), HF-1 Forklift, Drills with self contained power units, Micropile up to 14 inches helical pile.	55.17	30.95 + a
Group 3: Excavator; Gradall; Master Mechanic; Hoisting Engineer (all types of equipment where a drum and cable are used to hoist or drag material regardless of motive power of operation), Rubber Tire Excavator (Drott-1085 or similar);Grader Operator; Bulldozer Fine Grade (slopes, shaping, laser or GPS, etc.). (Trade License Required)	54.13	30.95 + a
Group 4: Trenching Machines; Lighter Derrick; CMI Machine or Similar; Koehring Loader (Skooper), Goldhofer.	53.61	30.95 + a
Group 5: Specialty Railroad Equipment; Asphalt Paver; Asphalt Spreader; Asphalt Reclaiming Machine; Line Grinder; Concrete Pumps; Drills with Self Contained Power Units; Boring Machine; Post Hole Digger; Auger; Pounder; Well Digger; Milling Machine (over 24" mandrel)	52.78	30.95 + a
Group 5 continued: Side Boom; Combination Hoe and Loader; Directional Driller, Geothermal Drill.	52.78	30.95 + a
Group 6: Front End Loader (3 up to 7 cubic yards); Bulldozer (rough grade dozer).	52.35	30.95 + a
Group 7: Asphalt Roller; Concrete Saws and Cutters (ride on types); Vermeer Concrete Cutter; Stump Grinder; Scraper; Snooper; Skidder; Milling Machine (24" and under Mandrel)	51.89	30.95 + a

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Group 8: Mechanic, Grease Truck Operator, Hydroblaster, Barrier Mover, Power Stone Spreader; Welder; Work Boat under 26 ft.; Transfer Machine, Rigger Foreman.	51.34	30.95 + a
Group 9: Front End Loader (under 3 cubic yards), Skid Steer Loader regardless of attachments (Bobcat or Similar); Fork Lift, Power Chipper; Landscape Equipment (including hydroseeder), Vacuum Excavation Truck and Hydrovac Excavation Truck (27 HG pressure or greater).	50.74	30.95 + a
Group 10: Vibratory Hammer, Ice Machine, Diesel and Air Hammer, etc.	47.91	30.95 + a
Group 11: Conveyor, Earth Roller; Power Pavement Breaker (whiphammer), Robot Demolition Equipment.	47.91	30.95 + a
Group 12: Wellpoint Operator.	47.82	30.95 + a
Group 13: Compressor Battery Operator.	47.04	30.95 + a
Group 14: Elevator Operator; Tow Motor Operator (Solid Tire No Rough Terrain).	45.45	30.95 + a
Group 15: Generator Operator; Compressor Operator; Pump Operator; Welding Machine Operator; Heater Operator.	44.89	30.95 + a
Group 16: Maintenance Engineer and Articulating End Dump.	43.99	30.95 + a
Group 17: Portable Asphalt Plant Operator; Portable Crusher Plant Operator; Portable Concrete Plant Operator., Portable Grout Plant Operator, Portable Water Filtration Plant Operator.	49.95	30.95 + a
Group 18: Power Safety Boat; Vacuum Truck; Zim Mixer; Sweeper; (minimum for any job requiring CDL license), Rigger, Signalman.	46.6	30.95 + a
Surveyor: Chief of Party	50.21	30.95 + a

Surveyor: Assistant Chief of Party	46.3	30.95 + a
Surveyor: Instrument Man	44.55	30.95 + a
Surveyor: Rodman or Chairman	38.34	30.95 + a

**NOTE: SEE BELOW

----LINE CONSTRUCTION----(Railroad Construction and Maintenance)----

20) Lineman, Cable Splicer, Technician	59.91	34.00
21) Heavy Equipment Operator	53.92	31.88
22) Equipment Operator, Tractor Trailer Driver, Material Men	50.92	30.84
23) Driver Groundmen	44.93	28.47
23a) Groundman Experienced	32.95	13.99

----OUTSIDE LINE CONSTRUCTION----

24) Driver Groundmen	43.78	28.42
25) Groundmen	32.1	13.95
26) Heavy Equipment Operators	52.53	31.83

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27) Linemen, Cable Splicers, Dynamite Men	58.37	33.94
28) Material Men, Tractor Trailer Drivers, Equipment Operators	49.61	30.79
29) Technician	56.12	32.85
----COMMUNICATION----		
Sales & Service Technician: To include but not limited to: Installation, Repair, Splicing and Maintenance	52.07	20.62
----DREDGING----		
Class A1: Mechanical Dredge Operator	48.48	17.32+a+b
Class B1: Maintenance Engineer	41.93	16.87+a+b
Class C1: Mate/Welder	38.38	16.62+a+b
Class D: Deckhand	30.86	16.09+a+b

Welders: Rate for craft to which welding is incidental.
Surveyors: Hazardous material removal: $3.00 per hour premium.
*Note: Hazardous waste removal work receives additional $1.25 per hour for truck drivers.
**Note: Hazardous waste premium $3.00 per hour over classified rate.
Truck Drivers: Trainers Premium: $3.00 over wage rate.
Truck Drivers: Night Premium - Mixer Drivers: $2.00 over wage rate.

Crane with 150 ft. boom (including jib) - $1.50 extra
Crane with 200 ft. boom (including jib) - $2.50 extra
Crane with 250 ft. boom (including jib) - $5.00 extra
Crane with 300 ft. boom (including jib) - $7.00 extra
Crane with 400 ft. boom (including jib) - $10.00 extra

As of: September 4, 2026

All classifications that indicate a percentage of the fringe benefits must be calculated at the percentage rate times the "base hourly rate".

Apprentices duly registered under the Commissioner of Labor's regulations on "Work Training Standards for Apprenticeship and Training Programs" Section 31-51-d-1 to 12, are allowed to be paid the appropriate percentage of the prevailing journeymen hourly base and the full fringe benefit rate, providing the work site ratio shall not be less than one full-time journeyperson instructing and supervising the work of each apprentice in a specific trade.

~~Connecticut General Statute Section 31-55a: Annual Adjustments to wage rates by contractors doing state work ~~

The Prevailing wage rates applicable to this project are subject to annual adjustments each July 1st for the duration of the project.
Each contractor shall pay the annual adjusted prevailing wage rate that is in effect each July 1st, as posted by the Department of Labor.
It is the contractor's responsibility to obtain the annual adjusted prevailing wage rate increases directly from the Department of Labor's website.
The annual adjustments will be posted on the Department of Labor's Web page: www.ct.gov/dol. For those without internet access, please contact the division listed below.
The Department of Labor will continue to issue the initial prevailing wage rate schedule to the Contracting Agency for the project.
All subsequent annual adjustments will be posted on our Web Site for contractor access.
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All Person who perform work ON SITE must be paid prevailing wage for the appropriate mechanic, laborer, or worker classification.

All certified payrolls must list the hours worked and wages paid to All Persons who perform work ON SITE regardless of their ownership i.e.: (Owners, Corporate Officers, LLC Members, Independent Contractors, et. al)

Reporting and payment of wages is required regardless of any contractual relationship alleged to exist between the contractor and such person.

~~Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clause (29 CFR 5.5 (a) (1) (ii)).

Please direct any questions which you may have pertaining to classification of work and payment of prevailing wages to the Wage and Workplace Standards Division, telephone (860)263-6790.

As of: September 4, 2026

SECTION 01 10 00
SUMMARY

PART 1 GENERAL

1.01 PROJECT

A. Project Name: Sludge Handling Improvements.

B. Owner's Name: Town of Putnam.

C. Engineer's Name: Fuss & O'Neill Inc.

This project consists of furnishing and installing one (1) 30-ft diameter gravity thickener tank and mechanism, second Moyno Sludge Pump in lower level of solids handling building, reinforced fiberglass cover, SCADA and electrical improvements, yard piping, valves, water main relocation, and associated site restoration.

1.02 CONTRACT DESCRIPTION

A. Contract Type: A single prime contract based on a Stipulated Price as described in Document 00 52 00 - Agreement Form.

1.03 OWNER OCCUPANCY

A. Owner intends to continue to occupy adjacent portions of the existing buildings/facilities during the entire construction period.

B. Owner intends to occupy the Project upon Substantial Completion.

C. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.

D. Schedule the Work to accommodate Owner occupancy.

1.04 CONTRACTOR USE OF SITE AND PREMISES

A. Construction Operations: Limited to areas noted on Drawings.
   1. Locate and conduct construction activities in ways that will limit disturbance to site.

B. Arrange use of site and premises to allow:
   1. Owner occupancy.

C. Provide access to and from site as required by law and by Owner:
   1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
   2. Do not obstruct roadways, sidewalks, or other public ways without permit.

D. Utility Outages and Shutdown:
   1. Do not disrupt or shut down life safety systems, including but not limited to fire sprinklers and fire alarm system, without 7 days notice to Owner and authorities having jurisdiction.
   2. Prevent accidental disruption of utility services to other facilities.

1.05 WORK SEQUENCE

A. Coordinate construction schedule and operations with Owner.

B. Coordinate construction schedule and operations with Engineer.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

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SECTION 01 10 05
MAINTENANCE OF PLANT OPERATIONS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. The existing Wastewater Treatment Facility functions include screening, grit removal, primary settling, rotating biological contactors, final settling, chlorination, effluent pumping, and sludge dewatering. Treated wastewater is discharged to the Quinebaug River.

B. Maintain these functions throughout the contract period, unless otherwise specified, to prevent interruption of function, or deterioration in the quality of treated effluent.

1.03 SCHEDULING

A. The Contractor shall submit to the Engineer a schedule of construction for the Work under this Contract in accordance with the requirements of "Construction Schedule" included in Specification Section 01 32 16, Submittals and the requirement contained herein. The schedule shall indicate the anticipated timing of construction of new facilities as well as demolition and modification of existing structures and equipment. In addition to this, at least 30 days prior to the construction of any Work or part thereof which will interfere with the existing plant operations or facilities, the Contractor shall submit to the Engineer a detailed schedule/sequence of this proposed construction. The detailed schedule/sequence shall include the time period and nature of the interference and what temporary measures or facilities shall be utilized to accomplish the work, minimize the interruption, and maintain plant operation.

B. All electrical work shall be scheduled to allow continuous electrical operation of existing facilities with a minimum of required outages. Any power outage of any Work which requires interruption of plant flow or processes shall be scheduled during the normally dry-weather period of year and at times of day or night when sewage flows are low.

1. The existing generator shall be used to provide backup power to the plant operations for any power outages required due to service panel modifications at the existing storage and blower buildings. The existing generator shall not be removed until the new generators are online and able to provide backup power.

C. All temporary systems for maintaining plant operations shall be the sole responsibility of the Contractor at no additional cost to the Owner.

D. Any shutdown that affects the operation of the plant, regardless of duration, requires prior written approval of the Owner and Engineer.

E. The schedules as accepted shall be adhered to, except as deviations therefrom are expressly permitted by the Owner.

F. The Owner reserves the right to order the Contractor to reschedule the Work at any time if, in his sole judgment, weather conditions, flow conditions or other factors would adversely affect the plant operation, plant performance, or effluent quality during the conduct of the Work.

1.04 PROVISIONS

A. The Contractor shall make whatever provisions are necessary to protect and maintain the continued operation of the existing facilities. Such provisions shall include, but not necessarily be limited to, such items as:

1. Protection of the structural integrity of all existing structures, including structures scheduled for demolition until such time as they can be demolished as permitted.

2. Installation of suitable temporary piping, electrical, controls and equipment to replace items which must be demolished, in part, in order to construct new facilities. Such provisions shall include, in addition to the more obvious features, installation of suitable temporary electrical work including controls, alarms, etc., the heating and insulation of such temporary conduits as necessitated by weather and exposure to the elements all as necessary to maintain existing plant functions.
3. Maintenance of suitable temporary access roads to provide convenient access to all existing treatment facilities at all times for emergency access and normal plant operations including daily tanker trucks. The Contractor shall keep access roads reasonably free of dust, ruts, snow and construction traffic.
4. All Work of connecting with, cutting into, and reconstructing existing facilities shall be planned to interfere with operation of the said facilities for the shortest possible time when the demands on the facilities best permit such interference, even though it may be necessary to work outside the normal working hours to meet these requirements. Before starting Work which will interfere with the operation of such facilities, the Contractor shall do all possible preparatory work, including the construction of temporary connections and the provision of portable generators, pumping equipment, and piping, if required, and shall see that all tools, materials, and equipment are made ready and at hand.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 GENERAL

A. Do not operate valves, weirs, and electrical equipment in use by the Owner, except in emergencies.

B. Comply with Owner’s lock-out / tag-out procedures, and safety requirements and procedures.
   1. The Contractor may choose to apply lock-out / tag-out procedures, safety requirements, and safety procedures more stringent than those of the Owner’s.

END OF SECTION

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SECTION 01 14 00
WORK RESTRICTIONS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 USE OF SITE

A. Use of Site: Limit use of site to work in areas indicated. Do not disturb portions of site beyond areas in which the Work is indicated.
   1. Schedule construction operations to produce an expedient, orderly method and sequence of construction.
      a. Minimize the period an area is under construction.
   2. Regulatory Limits: Confine construction operations to the restrictions and conditions that are included within all Project permits.
   3. Driveways and Entrances: Keep driveways and entrances serving private property clear and available to property owner.
      a. For commercial driveways that require closure for construction, schedule closures for half of the driveway at a time. In cases where commercial sites have multiple driveway access, limit construction to one driveway at a time. Schedule closures with the property owner seven (7) days in advance of the closure. Provide Business Access signs redirecting traffic for the duration of the driveway closure.
      b. For residential driveways that require closure for construction, schedule closures with the property owner three (3) days in advance of construction.
      c. No excavations shall remain open overnight or during non-work periods.
   4. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
   5. A detour plan is not included as part of the Work. Any modifications that require the use of a detour must be approved by the Engineer and the appropriate regulatory agency prior to implementation.

1.03 COORDINATION OF WORKZONE ACTIVITIES

A. Allow Emergency Vehicles, fire trucks, and rubbish trucks to pass through the Work Zones unimpeded at all times. The Contractor shall coordinate with and notify these various agencies, daily if needed, to allow services to be provided.

1.04 ARCHAEOLOGICAL FINDS

A. Upon encountering any archaeological material, including but not limited to "charcoal", "bone", "shell", "cultural objects (fire cracked stones/stone flaking material)", "middens", or any other artifacts or related items of historical significance, the Contractor shall immediately cease all work and notify the Engineer and the Owner.

1.05 WINTER SHUTDOWN

A. Winter shutdowns may not start before December 1 and must end before April 1.

B. Secure stockpiles and equipment to the satisfaction of the Engineer before closing down operation for the winter.

C. During the winter shutdown period the Contractor shall relocate all materials and equipment to his storage yard. Materials and equipment shall not be left throughout the project site.

D. Provide the Owner a minimum of two weeks' notice before resuming construction in the spring.

1.06 WORK HOURS

A. Schedule work activities between 7:00 AM and 3:30 PM, Monday through Friday.
   1. Make arrangements through Owner and Engineer for access at other times.

B. Utility Facilities Restrictions
   1. Confirm requirements and excavation restrictions with each individual utility company.

1.07 ROCK EXCAVATION

A. Use alternate method to blasting, if needed. Submit proposed method of rock excavation to Engineer for review.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.01 TEST PITS

A. At indicated areas and where directed by the Engineer, test pit information may be used to revise the location of sewers, and pump station to meet actual field conditions.
   1. Perform test pits in accordance with Section 31 Earthwork Specifications.

3.02 RIGHT-OF-WAYS

A. Keep construction activities within right-of-way and construction easement lines. Keep disturbances to a minimum. Restore areas to their original conditions.

3.03 UTILITY COMPANY RESTRICTIONS

A. Confirm requirements and restrictions with individual utility companies.

END OF SECTION

SECTION 01 20 00
PRICE AND PAYMENT PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Procedures for preparation and submittal of applications for progress payments.

1.02 SCHEDULE OF VALUES

A. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit draft to Engineer for approval.

B. Forms filled out by hand will not be accepted.

1.03 APPLICATIONS FOR PROGRESS PAYMENTS

A. Payment Period: Submit at intervals stipulated in the Agreement.

B. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Engineer for approval.

C. Forms filled out by hand will not be accepted.

D. Execute certification by signature of authorized officer.

E. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed and for stored products.

F. List each authorized Change Order as a separate line item, listing Change Order number and dollar amount as for an original item of work.

G. Submit one electronic and three hard-copies of each Application for Payment.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

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SECTION 01 20 50
PAYMENT ITEMS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes measurement and payment paragraphs for
   1. Base Bid payment items (lump sum and unit price).

B. Related Sections of the Specifications include the following:
   1. Division 01 through 50 Sections for detailed procedural, material, and installation requirements associated with the Work of each payment item.
   2. Work not specified in the bid items below should be considered incidental to the work and not measured separately for payment.

C. Related Requirements in the Specifications:
   1. Division 01 Section "Contract Modification Procedures" for procedures for submitting and handling Change Orders.

1.03 DEFINITIONS

A. Payment Items: The Owner's distribution of the Contract Price through listed work items.
   1. Each item is specified to include a defined scope of services. However, not all materials, labor, equipment, or services of a payment item are guaranteed to be listed or specified.
   2. Include costs associated with items of work required to complete the defined scope of services within the appropriately specified payment item.
   3. Payment items include all necessary material, plus cost for delivery, installation, applicable taxes, overhead, and profit.

B. Unit price is an amount incorporated in the Agreement, applicable during the duration of the Work as a price per unit of measurement for materials, equipment, or services, or a portion of the Work, added to or deducted from the Contract Price by appropriate modification, if the scope of Work or estimated quantities of Work required by the Contract Documents are increased or decreased.

C. Payment for Work associated with individual Work Segments will not be released until such Work Segment is Substantially Complete, including site restoration and site improvements of that Work Segment and has been approved as such by the Site Manager.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 BASE BID PAYMENT ITEMS

A. Item No. 1 – Mobilization and Project Closeout
   1. Will not be measured for payment.
   2. This item will be paid for at the Contract lump sum price per “Mobilization and Project Closeout” including coordination, materials, equipment, tools, and labor incidental to the Work.
      a. Payment will be earned in proportion to “double” the amount of work completed as determined by the Engineer, thus paying up to 90% of the value of the complete item value when 45% of the contract value is complete. The remaining 10% value will be paid as part of the final payment.

B. Item No. 2 – Field Office
   1. Measured by the month. Measurement shall not begin until the facilities, equipment, supplies, and services have been provided to the satisfaction of the Engineer.
   2. Paid for at the Contract unit price per month for “Field Office” including facilities with parking area, equipment, supplies, janitorial services, electricity, telephone, internet and other services incidental to the Work.

C. Item No. 3 – Silt Fence
   1. Measured by the linear foot along top of silt fence actually installed and accepted.
   2. Paid for by the linear foot installed and accepted including materials, equipment, tools, and labor incidental to the Work, and the following:
      a. Maintenance and replacement of silt fence as directed;
      b. Removing and disposing of silt fence and accumulated sediment; and
      c. Restoration and grading of the areas to the satisfaction of the Engineer.

D. Item No. 4 – Straw Waddle / Silt Sock
   1. Measured by the linear foot along top of Straw Waddle / Silt Sock actually installed and accepted.
   2. Paid for by the linear foot of “Straw Waddle / Silt Sock” that are installed and accepted including, materials, equipment, tools, and labor incidental to the Work, and the following:
      a. Maintenance and replacement of haybales as directed;
      b. Removing and disposing of haybale material and accumulated sediment; and
      c. Restoration and grading of the areas to the satisfaction of the Engineer.

E. Item No. 5 - Record Drawings
   1. Will not be measured for payment.
   2. This item will be paid for at the Contract fixed lump sum price per “Record Drawings” including coordination, materials, equipment, tools, and labor incidental to the Work.
      a. The Lump Sum shall be paid for at the contract item price that is shown in the bid schedule.
      b. Payment will be made upon the satisfactory completion and acceptance of the Record Drawings.

F. Item No. 6 – Test Pits
   1. Measured by the cubic yard of test pit excavated and backfilled.
   2. Paid for at the Contract Unit price per cubic yard of “Test Pits” for excavating and backfilling with suitable material, repaving and restoring area to existing conditions or better, paving repair, and removing and disposing of unsuitable material, as directed by the Engineer, including materials, equipment, tools and labor incidental to the Work.

G. Item No. 7 – Rock Excavation
   1. Measured by the cubic yard of rock excavated, measured in original position, but not to exceed the following:
      a. From the top of the exposed rock prior to blasting/removal operations.
      b. 24 inches outside of precast concrete structures, and outside of concrete forms other than at footings and 8 inches below concrete bases.
      c. 6 inches minimum beneath bottom of concrete slabs on grade.
      d. 6 inches beneath pipe in trenches, inner pipe diameter plus two feet on either side for trench width, and 3 feet horizontally at the ends of building connections and stubs as indicated on the Drawings.
      e. Incidental concrete structures that are to be removed will be measure as rock by measuring the actual side walls and tops and bottoms of structures. The internal hollow space will not be measured for payment.
   2. Paid for at the Contract Unit price per cubic yard excavated as detailed that is measured and accepted for removing and disposing of rock, backfilling with satisfactory soil material, as directed by the Engineer, including materials, equipment, tools and labor incidental to the Work.
      a. Rock excavation shall also include the work required to provide and place suitable backfill material in the amount equal to replace the rock which is excavated.

H. Item No. 8 - Selective Demolition
   1. Will not be measured for Payment.
   2. This item will be paid for at the Contract lump sum price per “Selective Demolition” as shown on the plans and including but not limited to the removal and proper disposal of existing pavement, odor control equipment system and piping, existing electrical conduit, existing sludge draw off piping, existing sanitary manhole, 12-inch CI sanitary sewer piping, 6-inch CI sludge thickener bypass piping, sludge, 6-inch water main, a light pole, electrical & controls/SCADA conduit and wiring, hydrant assembly, and 4-inch water main for relocation.

I. Item No. 9 - Gravity Thickener and Appurtenances

   1. This work will not be measured for payment.

      a. Schedule of values will be prepared by the Contractor and approved by the Engineer.

   2. Paid by the Contract lump sum for “Gravity Thickener and Appurtenances” that includes the site work, excavation, backfill (except for rock), structural fill, stone bedding, shoring, cast-in-place concrete tank, mechanism, grouting, FRP Cover, Moyno Sludge Pump, valves, piping, including materials, equipment, tools, and labor incidental to the Work. Payment will be made in accordance with the approved Schedule of Values.

J. Item No. 10 - Electrical Modifications

   1. This work will not be measured for payment.

      a. Schedule of values will be prepared by the Contractor and approved by the Engineer.

   2. Paid by the Contract lump sum for “Electrical Modifications” that includes the modification of the following: lighting conduit and wiring back to the Primary Clarifier, conduit and conductors back to the source for the existing thickener and provide temporary power, remove conduit and wiring for odor control system back to the building, remove lighting circuit conduit and wiring as part of relocation. Provide new conduit and wiring as shown on Contract Drawings for new Gravity Thickener and Existing Gravity Thickener, lighting, new receptacles, New motor for new Gravity Thickener, junction boxes for the installation, handholes, new seal offs for conduits, and connections to the existing Motor Control Center and cabinets in the Sludge Handling Building cabinets

K. Item No. 11 - Yard Piping Modifications

1. This work will not be measured for payment.

   a. Schedule of values will be prepared by the Contractor and approved by the Engineer.

2. Paid by the Contract lump sum for “Yard Piping Modifications” that include relocation of the existing water main, installation of new sludge bypass piping, installation of sanitary manhole for feeding the gravity thickeners, installation of new sludge draw off piping for both the existing and the new gravity thickener, valves for the piping for sludge drawoff and for bypass piping, and the installation of a new hydrant as shown on the Contract Drawings.

L. Item No. 12 – SCADA Modifications

1. This work will not be measured for payment.

   a. Schedule of values will be prepared by the Contractor and approved by the Engineer.

2. Paid by the Contract lump sum for “SCADA Allowance” that includes the integration of the gravity thickener, integration of the Moyno pump, and SCADA modification as specified in the Specifications

END OF SECTION

SECTION 01 21 00
ALLOWANCES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes administrative and procedural requirements governing allowances.
   1. Certain materials and equipment are specified in the Contract Documents by allowances. In some cases, these allowances include installation. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when additional information is available for evaluation. If necessary, additional requirements will be issued by Change Order.

B. Types of allowances include the following:
   1. Record Drawings
   2. Controls & SCADA Integration Allowance

C. Related Sections include the following:
   1. Section 01 26 00 – Contract Modification Procedures: For procedures for submitting and handling Change Orders.

1.03 PROPOSALS

A. At the earliest practical date after award of the Contract, advise Engineer of the date when final purchase of each system described by an allowance must be completed to avoid delaying the Work.

B. At Engineer's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.

1.04 SUBMITTALS

A. Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.

B. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.

1.05 UTILITY ALLOWANCES

A. Utility allowances include the cost of engaging utility agencies to provide and install specified services.

B. The allowance does not include incidental labor required to assist the utility company. The cost for incidental labor to assist the utility company shall be included in the appropriate payment item.

C. At Project closeout, credit unused amounts remaining in the utility allowance to Owner by Change Order.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.02 PREPARATION

A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

3.03 SCHEDULE OF ALLOWANCES

A. Refer to the Bid Form for allowances that are to be included in the Base Bid.

B. **Allowance for Record Drawings**: Include the sum of 5,000 dollars.
   1. The allowance includes the costs associated with the coordination and creation of Record Drawings incidental to the work.

C. **Allowance for Controls and SCADA Integration:** Include the sum of 20,000 dollars.
   1. The allowance includes the costs associated with controls and SCADA integration associated with the gravity thickener and Moyno Pump, as well as SCADA modifications as specified in the Specifications.

END OF SECTION

SECTION 01 25 00
SUBSTITUTION PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Procedural requirements for proposed substitutions.

1.02 RELATED REQUIREMENTS

A. Section 01 30 00 - Administrative Requirements.

B. Section 01 60 00 - Product Requirements:

1.03 DEFINITIONS

A. Substitutions: Changes from Contract Documents requirements proposed by Contractor to materials, products, assemblies, and equipment.
   1. Substitutions for Cause: Proposed due to changed Project circumstances beyond Contractor's control.
   2. Substitutions for Convenience: Proposed due to possibility of offering substantial advantage to the Project.
      a. Substitution requests offering advantages solely to the Contractor will not be considered.

1.04 REFERENCE STANDARDS

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

A. A Substitution Request for products, assemblies, materials, and equipment 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, equipment, assembly, or system.
   2. Agrees to provide the same warranty for the substitution as for the specified product.
   3. Agrees to provide same or equivalent maintenance service and source of replacement parts, as applicable.
   4. Agrees to coordinate installation and make changes to other work that may be required for the work to be complete, with no additional cost to Owner.
   5. Waives claims for additional costs or time extension that may subsequently become apparent.
   6. Agrees to reimburse Owner and Engineer for review or redesign services associated with re-approval by authorities.

B. A Substitution Request for specified installer constitutes a representation that the submitter:

C. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents. Burden of proof is on proposer.

D. Content: Include information necessary for tracking the status of each Substitution Request, and information necessary to provide an actionable response.
   1. Forms indicated in the Project Manual are adequate for this purpose, and must be used.

E. Limit each request to a single proposed substitution item.

3.02 SUBSTITUTION PROCEDURES DURING PROCUREMENT

A. Submittal Time Restrictions:
   1. Instructions to Bidders specifies time restrictions and the documents required for submitting substitution requests during the bidding period.

B. Submittal Form (before award of contract):
   1. Submit substitution requests by completing the form attached to this section. See this form for additional information and instructions. Use only this form; other forms of submission are unacceptable.

3.03 SUBSTITUTION PROCEDURES DURING CONSTRUCTION

A. Submittal Form (after award of contract):
   1. Submit substitution requests by completing the form attached to this section. See this section for additional information and instructions. Use only this form; other forms of submission are unacceptable.

3.04 RESOLUTION

A. Engineer may request additional information and documentation prior to rendering a decision. Provide this data in an expeditious manner.

B. Engineer will notify Contractor in writing of decision to accept or reject request.

3.05 ACCEPTANCE

A. Accepted substitutions change the work of the Project. They will be documented and incorporated into work of the project by Change Order, Construction Change Directive, Architectural Supplementary Instructions, or similar instruments provided for in the Conditions of the Contract.

3.06 CLOSEOUT ACTIVITIES

A. See Section 01 78 00 - Closeout Submittals, for closeout submittals.

3.07 ATTACHMENTS

A. A facsimile of the Substitution Request Form (During Construction) required to be used on the Project is included after this section.

END OF SECTION

SECTION 01 26 00
CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section specifies administrative and procedural requirements for handling and processing Contract modifications.

1.03 FIELD ORDER

A. Engineer will issue written supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time. A sample copy of a Field Order is included at the end of the Section.

1.04 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: Engineer will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Price or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
   1. Proposal Requests issued by Engineer are for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change.
   2. Within time specified in Proposal Request after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Price and the Contract Time necessary to execute the change.
      a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
      b. Indicate delivery charges, equipment rental, and amounts of trade discounts.
      c. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

B. Contractor-Initiated Proposals: If latent or unforeseen conditions require modifications to the Contract, Contractor may propose changes by submitting a request for a change.
   1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Price and the Contract Time.
   2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
   3. Indicate delivery charges, equipment rental, and amounts of trade discounts.
   4. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

C. Proposal Request Form: For Change Order proposals, use forms provided by Owner. Sample copies are included at end of this Section.

1.05 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Proposal Request, Engineer will issue a Change Order for signatures of Owner and Contractor on EJCDC Document C-941.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.01 ATTACHED FORMS

1. Proposal Request.
2. Field Order (EJCDC Form C-942, Edition 2018).
3. Change Order (EJCDC Form C-941, Edition 2018).
4. Work Change Directive (EJCDC Form C-940, Edition 2018).

END OF SECTION

PROPOSAL REQUEST

Proposal Request No. _____

OWNER Town of Putnam
CONTRACTOR _____
Contract: _____
Project: Sludge Handling Improvements
OWNER's Contract No. _____ ENGINEER's Project No. 1998386.P91

Please submit an itemized quotation for changes in the Contract Price or Contract Time incidental to the proposed modifications to the Contract Documents described herein.

Description:

Attachments: (List documents supporting description)

_____

By: _____

_____
ENGINEER

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FIELD ORDER NO.: _____

Owner:	Town of Putnam	Owner's Project No.:	
Engineer:	Fuss & O'Neill, Inc.	Engineer's Project No.:	1998386.P91
Contractor:		Contractor's Project No.:	
Project:	Sludge Handling Improvements		
Contract Name:			
Date Issued:		Effective Date of Field Order:	

Contractor is hereby directed to promptly perform the Work described in this Field Order, issued in accordance with Paragraph 11.04 of the General Conditions, for minor changes in the Work without changes in Contract Price or Contract Times. If Contractor considers that a change in Contract Price or Contract Times is required, submit a Change Proposal before proceeding with this Work.

Reference:

Specification Section(s):

Drawing(s) / Details (s):

Description:

Attachments:

Issued by Engineer

By: _____

Title: _____

Date: _____

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CHANGE ORDER NO.: ____

Owner:	Town of Putnam	Owner's Project No.:	
Engineer:	Fuss & O'Neill, Inc.	Engineer's Project No.:	1998386.P91
Contractor:		Contractor's Project No.:	
Project:	Sludge Handling Improvements		
Contract Name:			
Date Issued:		Effective Date of Field Order:	

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

Description:

Attachments:

CHANGE IN CONTRACT PRICE	**CHANGE IN CONTRACT TIMES** *[note changes in Milestones if applicable]*
Original Contract Price: $_____	Original Contract Times: Substantial Completion: _____ Ready for Final Payment: _____ days or dates
[Increase] [Decrease] from previously approved Change Orders No. __ to No. __: $_____	[Increase] [Decrease] from previously approved Change Orders No. __ to No. __: Substantial Completion: _____ Ready for Final Payment: _____ Days
Contract Price prior to this Change Order: $_____	Contract Times prior to this Change Order: Substantial Completion: _____ Ready for Final Payment: _____ days or dates
[Increase] [Decrease] of this Change Order: $_____	[Increase] [Decrease] of this Change Order: Substantial Completion: _____ Ready for Final Payment: _____ days or dates
Contract Price incorporating this Change Order: $_____	Contract Times with all approved Change Orders: Substantial Completion: _____ Ready for Final Payment: _____ days or dates

RECOMMENDED:	ACCEPTED:	ACCEPTED:
By: _____	By: _____	By: _____
Engineer (if required)	Owner (Authorized Signature)	Contractor (Authorized Signature)
Title: _____	Title: _____	Title: _____
Date: _____	Date: _____	Date: _____

Approved by Funding Agency (if applicable)

By: _____ Title: _____ Date: _____

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WORK CHANGE DIRECTIVE NO.: ____

Owner:	Town of Putnam	Owner's Project No.:	
Engineer:	Fuss & O'Neill, Inc.	Engineer's Project No.:	1998386.P91
Contractor:		Contractor's Project No.:	
Project:	Sludge Handling Improvements		
Contract Name:			
Date Issued:		Effective Date of Field Order:	

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

Attachments:

Purpose for the Work Change Directive:

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

☐ 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:		

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SECTION 01 30 00
ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. General administrative requirements.

B. Electronic document submittal service.

C. Preconstruction meeting.

D. Progress meetings.

E. Contractor's daily reports.

F. Progress photographs.

G. Number of copies of submittals.

H. Requests for Interpretation (RFI) procedures.

I. Submittal procedures.

1.02 RELATED REQUIREMENTS

A. Section 00 72 05 – Standard General Conditions: Dates for applications for payment.

B. Section 00 73 05 C800 - Supplementary Conditions: .

C. Section 01 32 16 - Construction Progress Schedule:.

D. Section 01 60 00 - Product Requirements

E. Section 01 70 00 - Execution and Closeout Requirements

F. Section 01 78 00 - Closeout Submittals

1.03 GENERAL ADMINISTRATIVE REQUIREMENTS

A. Comply with requirements of Section 01 70 05 - Execution and Closeout Requirements for coordination of execution of administrative tasks with timing of construction activities.

B. Make the following types of submittals to Engineer:
   1. Requests for Interpretation (RFI).
   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. Correction Punch List and Final Correction Punch List for Substantial Completion.
   11. Closeout submittals.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 ELECTRONIC DOCUMENT SUBMITTAL SERVICE

A. All documents transmitted for purposes of administration of the contract are to be in electronic (PDF, MS Word, or MS Excel) format, as appropriate to the document, and transmitted via email.
   1. Besides submittals for review, information, and closeout, this procedure applies to Requests for Interpretation (RFIs), progress documentation, contract modification

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documents (e.g. supplementary instructions, change proposals, change orders), applications for payment, field reports and meeting minutes, Contractor's correction punch list, and any other document any participant wishes to make part of the project record.

2. It is Contractor's responsibility to submit documents in allowable format.
3. Paper document transmittals will not be reviewed; only emailed electronic documents will be reviewed.
4. All other specified submittal and document transmission procedures apply, except that electronic document requirements do not apply to samples or color selection charts.

B. Project Closeout: Engineer will determine when to terminate the service for the project and is responsible for obtaining archive copies of files for Owner.

3.02 PRECONSTRUCTION MEETING

A. Schedule meeting after Notice of Award.

B. Attendance Required:
1. Owner.
2. Engineer.
3. Contractor.

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, list of products, schedule of values, and progress schedule.
5. Submission of initial Submittal schedule.
6. Designation of personnel representing the parties to Contractor, Owner, and Engineer.
7. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
8. Scheduling.

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

3.03 PROGRESS MEETINGS

A. Schedule and administer meetings throughout progress of the work at maximum bi-monthly intervals.

B. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.

C. Attendance Required:
1. Contractor.
2. Owner.
3. Engineer.
4. Contractor's superintendent.
5. Major subcontractors.

D. Agenda:
1. Review minutes of previous meetings.
2. Review of work progress.
3. Field observations, problems, and decisions.
4. Identification of problems that impede, or will impede, planned progress.
5. Review of submittals schedule and status of submittals.
6. Review of RFIs log and status of responses.

7. Review of off-site fabrication and delivery schedules.
8. Maintenance of progress schedule.
9. Corrective measures to regain projected schedules.
10. Planned progress during succeeding work period.
11. Maintenance of quality and work standards.
12. Effect of proposed changes on progress schedule and coordination.
13. Other business relating to work.

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

3.04 DAILY CONSTRUCTION REPORTS

A. Include only factual information. Do not include personal remarks or opinions regarding operations and/or personnel.

B. Prepare a daily construction report recording the following information concerning events at Project site and project progress:
1. Date.
2. High and low temperatures, and general weather conditions.
3. List of subcontractors at Project site.
4. Material deliveries.
5. Safety, environmental, or industrial relations incidents.
6. Meetings and significant decisions.
7. Stoppages, delays, shortages, and losses. Include comparison between scheduled work activities (in Contractor's most recently updated and published schedule) and actual activities. Explain differences, if any. Note days or periods when no work was in progress and explain the reasons why.
8. Change Orders received and implemented.
9. Testing and/or inspections performed.
10. Signature of Contractor's authorized representative.

3.05 PROGRESS PHOTOGRAPHS

A. Submit photographs with each application for payment, taken not more than 3 days prior to submission of application for payment.

B. Photography Type: Digital; electronic files.

C. Provide photographs of site and construction throughout progress of work produced by an experienced photographer, acceptable to Engineer.

D. In addition to periodic, recurring views, take photographs of each of the following events:

E. Views:
1. Provide non-aerial photographs from four cardinal views at each specified time, until date of Substantial Completion.
2. Consult with Engineer for instructions on views required.
3. Provide factual presentation.
4. Provide correct exposure and focus, high resolution and sharpness, maximum depth of field, and minimum distortion.

3.06 REQUESTS FOR INTERPRETATION (RFI)

A. Definition: A request seeking one of the following:
1. An interpretation, amplification, or clarification of some requirement of Contract Documents arising from inability to determine from them the exact material, process, or system to be installed; or when the elements of construction are required to occupy the

same space (interference); or when an item of work is described differently at more than one place in Contract Documents.

B. Preparation: Prepare an RFI immediately upon discovery of a need for interpretation of Contract Documents. Failure to submit a RFI in a timely manner is not a legitimate cause for claiming additional costs or delays in execution of the work.
   1. Prepare a separate RFI for each specific item.
   2. Prepare using software provided by the Electronic Document Submittal Service.
   3. Combine RFI and its attachments into a single electronic file. PDF format is preferred.

C. Reason for the RFI: Prior to initiation of an RFI, carefully study all Contract Documents to confirm that information sufficient for their interpretation is definitely not included.
   1. Unacceptable Uses for RFIs: Do not use RFIs to request the following::
      a. Approval of submittals (use procedures specified elsewhere in this section).
      b. Approval of substitutions (see Section - 01 60 00 - Product Requirements)
      c. Changes that entail change in Contract Time and Contract Sum (comply with provisions of the Conditions of the Contract).
      d. Different methods of performing work than those indicated in the Contract Drawings and Specifications (comply with provisions of the Conditions of the Contract).
   2. Improper RFIs: Requests not prepared in compliance with requirements of this section, and/or missing key information required to render an actionable response. They will be returned without a response, with an explanatory notation.

D. Content: Include identifiers necessary for tracking the status of each RFI, and information necessary to provide an actionable response.
   1. Official Project name and number, and any additional required identifiers established in Contract Documents.
   2. Owner's, Engineer's, and Contractor's names.
   3. Discrete and consecutive RFI number, and descriptive subject/title.
   4. Issue date, and requested reply date.
   5. Reference to particular Contract Document(s) requiring additional information/interpretation. Identify pertinent drawing and detail number and/or specification section number, title, and paragraph(s).
   6. Annotations: Field dimensions and/or description of conditions which have engendered the request.
   7. Contractor's suggested resolution: A written and/or a graphic solution, to scale, is required in cases where clarification of coordination issues is involved, for example; routing, clearances, and/or specific locations of work shown diagrammatically in Contract Documents. If applicable, state the likely impact of the suggested resolution on Contract Time or the Contract Sum.

E. Attachments: Include sketches, coordination drawings, descriptions, photos, submittals, and other information necessary to substantiate the reason for the request.

F. Review Time: Engineer will respond and return RFIs to Contractor within seven calendar days of receipt. For the purpose of establishing the start of the mandated response period, RFIs received after 12:00 noon will be considered as having been received on the following regular working day.
   1. Response period may be shortened or lengthened for specific items, subject to mutual agreement, and recorded in a timely manner in progress meeting minutes.

G. Responses: Content of answered RFIs will not constitute in any manner a directive or authorization to perform extra work or delay the project. If in Contractor's belief it is likely to lead to a change to Contract Sum or Contract Time, promptly issue a notice to this effect, and follow up with an appropriate Change Order request to Owner.

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1. Response may include a request for additional information, in which case the original RFI will be deemed as having been answered, and an amended one is to be issued forthwith. Identify the amended RFI with an R suffix to the original number.
2. Notify Engineer within seven calendar days if an additional or corrected response is required by submitting an amended version of the original RFI, identified as specified above.

3.07 SUBMITTAL SCHEDULE

A. Submit to Engineer for review a schedule for submittals in tabular format.
   1. Submit at the same time as the preliminary schedule specified in Section - 01 32 16 - Construction Progress Schedule.
   2. Coordinate with Contractor's construction schedule and schedule of values.
   3. Arrange information to include scheduled date for initial submittal, specification number and title, submittal category (for review or for information), description of item of work covered, and role and name of subcontractor.
   4. Account for time required for preparation, review, manufacturing, fabrication and delivery when establishing submittal delivery and review deadline dates.
      a. For assemblies, equipment, systems comprised of multiple components and/or requiring detailed coordination with other work, allow for additional time to make corrections or revisions to initial submittals, and time for their review.

3.08 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 compliance with information given and the design concept expressed in Contract Documents.

C. Samples will be reviewed for aesthetic, color, or finish selection.

D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01 78 00 - Closeout Submittals.

3.09 SUBMITTALS FOR INFORMATION

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

B. Submit for Engineer's knowledge as contract administrator or for Owner.

3.10 SUBMITTALS FOR PROJECT CLOSEOUT

A. Submit Correction Punch List for Substantial Completion.

B. Submit Final Correction Punch List for Substantial Completion.

C. When the following are specified in individual sections, submit them at project closeout in compliance with requirements of Section 01 78 00 - Closeout Submittals:
   1. Project record documents.

2. Operation and maintenance data.
3. Warranties.
4. Bonds.
5. Other types as indicated.

D. Submit for Owner's benefit during and after project completion.

3.11 NUMBER OF COPIES OF SUBMITTALS

A. Electronic Documents: Submit one electronic copy in PDF format; an electronically marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected.

B. Samples: Submit the number specified in individual specification sections; one of which will be retained by Engineer.
1. After review, produce duplicates.
2. Retained samples will not be returned to Contractor unless specifically so stated.

3.12 SUBMITTAL PROCEDURES

A. General Requirements:
1. Use a separate transmittal for each item.
2. Submit separate packages of submittals for review and submittals for information, when included in the same specification section.
3. Sequentially identify each item. For revised submittals use original number and a sequential numerical suffix.
4. Identify: Project; Contractor; subcontractor or supplier; pertinent drawing and detail number; and specification section number and article/paragraph, as appropriate on each copy.
5. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with the requirements of the work and Contract Documents.
   a. Submittals from sources other than the Contractor, or without Contractor's stamp will not be acknowledged, reviewed, or returned.
6. Deliver each submittal on date noted in submittal schedule, unless an earlier date has been agreed to by all affected parties, and is of benefit to the project.
   a. Upload submittals in electronic form to Electronic Document Submittal Service website.
7. Schedule submittals to expedite the Project, and coordinate submission of related items.
   a. For each submittal for review, allow 15 days excluding delivery time to and from the Contractor.
   b. For sequential reviews involving Engineer's consultants, Owner, or another affected party, allow an additional 7 days.
   c. For sequential reviews involving approval from authorities having jurisdiction (AHJ), in addition to Engineer's approval, allow an additional 30 days.
8. Identify variations from Contract Documents and product or system limitations that may be detrimental to successful performance of the completed work.
9. Provide space for Contractor and Engineer review stamps.
10. When revised for resubmission, identify all changes made since previous submission.
11. Distribute reviewed submittals. Instruct parties to promptly report inability to comply with requirements.
12. Incomplete submittals will not be reviewed, unless they are partial submittals for distinct portion(s) of the work, and have received prior approval for their use.

B. Product Data Procedures:
1. Submit only information required by individual specification sections.
2. Collect required information into a single submittal.

3. Submit concurrently with related shop drawing submittal.
4. Do not submit (Material) Safety Data Sheets for materials or products.

C. Shop Drawing Procedures:
1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting Contract Documents and coordinating related work.
2. Do not reproduce Contract Documents to create shop drawings.
3. Generic, non-project-specific information submitted as shop drawings do not meet the requirements for shop drawings.

D. Samples Procedures:
1. Transmit related items together as single package.
2. Identify each item to allow review for applicability in relation to shop drawings showing installation locations.
3. Include with transmittal high-resolution image files of samples to facilitate electronic review and approval. Provide separate submittal page for each item image.

3.13 SUBMITTAL REVIEW

A. Submittals for Review: Engineer will review each submittal, and approve, or take other appropriate action.

B. Submittals for Information: Engineer will acknowledge receipt and review. See below for actions to be taken.

C. Engineer's actions will be reflected by marking each returned submittal using virtual stamp on electronic submittals.

D. Engineer's and consultants' actions on items submitted for review:
1. Authorizing purchasing, fabrication, delivery, and installation:
a. "Approved", or language with same legal meaning.
b. "Approved as Noted, Resubmission not required", or language with same legal meaning.
1) At Contractor's option, submit corrected item, with review notations acknowledged and incorporated.
c. "Approved as Noted, Resubmit for Record", or language with same legal meaning.
1) Resubmit corrected item, with review notations acknowledged and incorporated. Resubmit separately, or as part of project record documents.

E. Engineer's and consultants' actions on items submitted for information:
1. Items for which no action was taken:
a. "Received" - to notify the Contractor that the submittal has been received for record only.
2. Items for which action was taken:
a. "Reviewed" - no further action is required from Contractor.

END OF SECTION

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SECTION 01310
PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
   1. General project coordination procedures.
   2. Administrative and supervisory personnel.
   3. Project meetings.

B. Related Sections: The following Sections contain requirements that relate to this Section:
   1. Division 1 Section "Closeout Procedures" for coordinating Contract closeout.

1.03 COORDINATION

A. Coordination: Coordinate construction operations included in various Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections that depend on each other for proper installation, connection, and operation.
   1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
   2. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
   3. Make adequate provisions to accommodate items scheduled for later installation.

B. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
   1. Preparation of Contractor's Construction Schedule.
   2. Delivery and processing of submittals.
   3. Progress meetings.
   4. Project closeout activities.

1.04 SUBMITTALS

A. Key Personnel Names: At the preconstruction meeting, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home and office telephone numbers. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.

   1. Post copies of list in Project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.

1.05 ADMINISTRATIVE AND SUPERVISORY PERSONNEL

A. General: In addition to Project superintendent, provide other administrative and supervisory personnel as required for proper performance of the Work.

1.06 PROJECT MEETINGS

A. General: Engineer will schedule and conduct meetings and conferences at Project site, unless otherwise indicated.
   1. Attendees: Engineer will inform participants and others involved, and individuals whose presence is required, of date and time of each meeting.

2. Agenda: Engineer will prepare the meeting agenda and distribute the agenda to all invited attendees.
3. Minutes: Engineer will record significant discussions and agreements achieved, and distribute the meeting minutes to everyone concerned, including Owner.

B. Preconstruction Conference: Preconstruction conference will be attended by Owner, Contractor, and Engineer. Conference will be held at Project site or another convenient location. Meeting will be conducted to review responsibilities and personnel assignments.
1. Attendees: Authorized representatives of Owner, Engineer, and their consultants; and Contractor and its superintendent; shall attend the conference. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Discuss items of significance that could affect progress, including the following:
   a. Tentative construction schedule.
   b. Phasing.
   c. Critical work sequencing.
   d. Designation of responsible personnel.
   e. Procedures for processing field decisions and Change Orders.
   f. Procedures for processing Applications for Payment.
   g. Distribution of the Contract Documents.
   h. Submittal procedures.
   i. Preparation of Record Documents.
   j. Use of the premises.
   k. Parking availability.
   l. Office, work, and storage areas.
   m. Equipment deliveries and priorities.
   n. First aid.
   o. Security.
   p. Progress cleaning.
   q. Working hours.
   r. CT Prevailing Wages
3. Execution of Owner-Contractor Agreement including executed bonds and insurance certificates may be completed immediately prior to pre-construction conference.

C. Progress Meetings: Engineer will conduct progress meetings at regular intervals.
1. Attendees: In addition to representatives of Owner and Engineer, each contractor, subcontractor, supplier, and other entity required to finalize discussions regarding current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
   a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
   b. Review present and future needs of each entity present, including the following:
      1) Interface requirements.
      2) Sequence of operations.
      3) Status of submittals.
      4) Deliveries.
      5) Off-site fabrication.
      6) Access.
      7) Site utilization.

8) Temporary facilities and controls.
9) Work hours.
10) Hazards and risks.
11) Progress cleaning.
12) Quality and work standards.
13) Change Orders.
14) Documentation of information for payment requests.
15) Wage Classification Requests
16) Schedule of Value Updates
17) Partial Payment Estimates

3. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present. Include a brief summary, in narrative form, of progress since the previous meeting and report.
   a. Schedule Updating: Revise Contractor's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

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SECTION 01 32 16
CONSTRUCTION PROGRESS SCHEDULE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Preliminary schedule.

B. Construction progress schedule, bar chart type.

1.02 RELATED SECTIONS

A. Section 01 10 00 - Summary: Work sequence.

1.03 SUBMITTALS

A. Within 10 days after date of Agreement, submit preliminary schedule.

B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.

C. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.

D. Within 10 days after joint review, submit complete schedule.

E. Submit updated schedule with each Application for Payment.

F. Submit in PDF format.

G. Submit the number of opaque reproductions that Contractor requires, plus two copies that will be retained by Engineer.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRELIMINARY SCHEDULE

A. Prepare preliminary schedule in the form of a horizontal bar chart.

3.02 CONTENT

A. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction.

B. Identify each item by specification section number.

C. Show accumulated percentage of completion of each item, and total percentage of Work completed, as of the first day of each month.

D. Provide legend for symbols and abbreviations used.

3.03 BAR CHARTS

A. Include a separate bar for each major portion of Work or operation.

B. Identify the first workday of each week.

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. Annotate diagrams to graphically depict current status of Work.

D. Identify activities modified since previous submittal, major changes in Work, and other identifiable changes.

E. Indicate changes required to maintain Date of Substantial Completion.

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F. Submit reports required to support recommended 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 indicated in schedules.

END OF SECTION

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SECTION 01330
SUBMITTALS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 DESCRIPTION

A. This Section generally describes the types of submittals required during construction, procedures for making submittals, the preparation of submittals and the times submittals are required.

B. Additional submissions are required by the Instructions to Bidders and the General Conditions. Such submittals generally include Bids and Bidding Documents, insurance policies, certifications of bond and insurance coverage, Applications for Payment, requests for Change Orders, guarantees, permits, certifications, and documents required by Federal, State and Local authorities, submissions required by utility companies and other persons, firms or organizations and other such submittals.

C. The requirements of this Section are general in nature and apply to all Sections of the Specifications. Additional submissions and more specific requirements or submissions are contained in the various Specification Sections. In each individual Section, no attempt was made to cover or repeat the submissions contained in this Section and, therefore, the total of all submissions required are the combination of those described in this Section plus those specified in the various other Sections.

1.03 IDENTIFICATION OF SUBMITTALS

A. Completely identify each submittal and resubmittal by showing at least the following information (attached form may be used):
   1. Name of Project.
   2. Name, address, and telephone number of Contractor and Contractor's stamp of approval, indicating that the submission has been thoroughly checked by Contractor for conformance and fit.
   3. Name, address and telephone number of individual, firm or organization who will be doing the fabrication, supplying or manufacturing of equipment and materials and the name of the individual who may be contacted for further information.
   4. Drawing number and Specification Section number to which submittal applies.
   5. The location, service, equipment, designation and other information to specifically indicate the item for which acceptance is requested.
   6. Whether it is an original submittal (first submission) or a resubmittal (second, third, etc. submission).
   7. Submissions not containing the above shall be returned to Contractor, unreviewed by Engineer.

1.04 COORDINATION OF SUBMITTALS

A. Prior to submitting to Engineer, fully coordinate all interrelated work. As a minimum, the Contractor shall do the following:

1. Determine and verify all field dimensions and conditions, materials, catalog numbers and similar data.
2. Coordinate with all trades, subcontractors, other contractors, public agencies, and utility companies and secure all necessary approvals, in writing.
3. Clearly indicate any deviations from the Contract Documents.

B. Make submittals in groups containing all associated items which in some way depend upon each other. This also applies to color charts, as one color may not be able to be selected without the selection of other colors so as to form a color coordinated group. Engineer may elect not to review partial, incomplete submissions, whereupon the Engineer will return the incomplete submission to the Contractor for a resubmission of a complete submittal.

1.05 TIMING OF SUBMITTALS

A. Except where otherwise specifically noted, allow 14 days, after receipt by Engineer, for Engineer to review and process submittals. Some submittals may take longer than 15 days for the Engineer to review, in such, make submittals far enough in advance of scheduled dates of installation to provide time for reviews, for securing necessary acceptance, for possible revisions and resubmittals, and for placing orders and securing delivery.

B. Submissions may be returned unreviewed, rejected for several reasons, accepted conditioned upon submission of related items or for other reasons set forth in the Contract Documents.

C. Make submissions well in advance as the returning or rejecting of submissions or other similar circumstances area possible. Costs for these delays or those attributed to Contractor's tardiness in making submittals shall be borne by the Contractor.

1.06 DESTINATION OF SUBMITTALS

A. Unless otherwise specified, copies of every submission shall be sent to Engineer's home office as follows:

Town of Putnam Sludge Handling Improvements
Fuss & O'Neill, Inc.
Attn. Albert Wait
One Financial Plaza, 15th Floor
Hartford, CT 06103
albert.wait@fando.com

B. Facsimile transmissions will not be accepted.

1.07 CLARITY OF SUBMITTALS

A. All printed materials shall be neat, clean, clear and legible, and of such quality that they can be easily reproduced by normal photocopying or blueprinting machines. Copies not conforming to this paragraph will be returned to Contractor, unreviewed.

1.08 CONTRACTOR'S APPROVAL STAMP

A. The Contractor's approval 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):"

B. Each copy of every submittal shall be stamped with the Contractor's approval stamp.

1.09 ENGINEER'S REVIEW

A. Engineer will review and comment on each submission conforming to the requirements of this Section. 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 responsibilities under the Contract.

B. The Engineer's review and comments on shop drawings shall not relieve the Contractor of responsibility for any deviation from the requirements of the Contract Documents.

C. Shop Drawing Submittals will be marked as follows:
   1. Furnish As Submitted - Submittal appears to conform to Contract Documents and Contractor may proceed with ordering and installation.
   2. Furnish as Noted - Same as "Furnish as Submitted", except it is accepted on the basis that the modifications or notes added to the submittal by Engineer will be complied with by the Contractor.
   3. Rejected - Submission is not acceptable and shall be revised and resubmitted by Contractor.
   4. A copy of the Engineer's Shop Drawing Review stamp is attached hereto.

D. 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 "Furnish as Submitted" by Engineer.
   3. has been made and stamped "Furnish as Noted", but Contractor has not complied with Engineer's notes marked on the submittal.
   4. has been made and stamped "Furnish as Submitted", but item provided does not conform to the shop drawing.

1.010 OWNER'S REVIEW

A. Submittals that include spare parts and tools shall be submitted to the Project Owner for review and approval.

1.011 RESUBMISSIONS

A. Prepare new and additional submissions, make required corrections, and resubmit until accepted. For shop drawings, re-submit five (5) corrected hardcopies and one (1) electronic copy until accepted. On or with resubmittals, clearly describe revisions and changes made, other than the corrections requested by Engineer, which did not appear on the previous submissions.

1.012 CONTRACTOR'S RESPONSIBILITIES

A. 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.

B. No portion of the Work requiring a submission shall be commenced until the submission has been accepted by Engineer.

C. Any delay of approval resulting from the Contractor's failure to submit samples or data promptly shall not be used as basis of a claim against the Owner or the Engineer.

D. The materials and equipment used on the work shall correspond to the approved samples or other data.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.01 SCHEDULE OF VALUES

A. Within 10 days after the effective date of the Agreement, submit to Engineer three (3) copies of a schedule of values of the various portions of the Work, including quantities aggregating the total Contract Price, and supported by such data to substantiate its correctness as Engineer may require. Each item in the schedule of values shall include its proper share of overhead and profit. This schedule, when accepted by Engineer, shall only be used as a basis for Contractor's Periodic Estimate. No payments will be made to Contractor until such Schedule has been submitted and accepted by Engineer.

B. Within 10 days after the effective date of the Agreement, submit to Engineer three (3) copies of a Cash Flow Schedule including estimated monthly payment schedule for the Project.

C. On "unit price" items, the schedule of values shall contain unit prices for various stages of work, such as restoration of surfaces broken down into paved, unpaved and other types of areas to be restored.

D. On "per each" or "lump sum" items, break prices down sufficiently to provide a convenient and realistic means for determining the amount of work done during various stages of progress.

E. Where prices are not broken down sufficiently to accurately determine the value of Work completed, Engineer will estimate the value of the Work completed and will deduct some amount so as to arrive at a conservative value which will allow Owner to easily complete the Work with the unpaid balance. When the required detail in the Schedule of Values is not provided by Contractor, Contractor agrees to accept Engineer's determinations.

3.02 CERTIFIED TEST REPORT

A. The Certified Test Report is a document containing a list of the dimensional, chemical, metallurgical, electrical and physical results obtained from an actual test of the materials involved, and shall certify that the materials meet the requirements of the plans and specifications, and shall also include the following information:

1. Item number and description of material.
2. Date of manufacture.
3. Date of testing.
4. Name of organization to whom the material is consigned.
5. Quantity of material represented, such as batch, lot, group, etc.
6. Means of identifying the consignment, such as label, marking, lot number, etc.
7. Date and method of shipment.
8. Name of organization performing tests.

B. The Certified Test Report shall be signed by an authorized and responsible agent for the organization manufacturing the material, and it shall be notarized.

3.03 MATERIALS CERTIFICATE

A. A Materials Certificate is a document certifying that the materials, components and equipment furnished, conform to all requirements of the plans and specifications. The document shall also include the following information:
1. Project to which the material is consigned.
2. Name of contractor to whom material is supplied.
3. Item number and description of material.
4. Quantity of material represented by the certificate.
5. Means of identifying the consignment, such as label, marking, lot numbers, etc.
6. Date and method of shipment.

B. The Materials Certificate shall be signed by an authorized and responsible agent for the organization supplying the material, and it shall be notarized.

3.04 CERTIFICATE OF COMPLIANCE

A. A Certificate of Compliance is a document certifying that the materials, components and equipment covered by the previously submitted Certified Test Report and Materials Certificate, have been installed in the work and that they conform to all the requirements of the plans and specifications. The following information shall also be required on the document:
1. Project number.
2. Item Number and description of material.
3. Quantity represented by the certificate.
4. Name of manufacturer.

B. The Certificate of Compliance shall be signed by an authorized and responsible agent for the prime Contractor, and shall be notarized.

C. The Contractor shall be required to submit a Certificate of Compliance for all materials incorporated into the work. Any materials that the Engineer tests and which fail will require that the Contractor, at the Contractor's expense, make all additional tests needed to demonstrate that the materials comply with the necessary requirements. A sample "Certificate of Compliance" is attached hereto.

3.05 CONSTRUCTION SCHEDULE

A. Within 10 days after the contract is awarded, submit for Engineer's and Owner's information, a construction schedule showing, in detail, the proposed sequence of the Work and the estimated date of starting and completing each stage of the Work in order to complete the

Project within the Contract Time. Prepare the schedule in a manner so that the actual project progress of the Work can be recorded and compared with the expected progress. Coordinate the construction schedule with the proposed schedules of other contractors, if any, engaged in work at, or adjacent to, the Project site.

B. Coordinate the work and make every effort to maintain the construction schedule. In the event actual progress begins to lag the schedule, promptly employ additional means or methods of construction to make up the lost time.

C. Notify Engineer in writing 72 hours before commencing any work at the site and at least 48 hours before resuming work in the case of a temporary suspension of work.

D. Keep the construction schedule current and revise or confirm the schedule in accordance with General Conditions, Article 6.04 to accurately reflect the conditions of the Work, past progress, and anticipated future progress.

E. Prepare and submit, with Construction Schedule, a separate schedule listing dates for submission and dates reviewed shop drawings, project data and samples will be needed for each product.

3.06 SHOP DRAWINGS

A. As defined in the General Conditions and as specified in individual work sections, shop drawings include, but are not necessarily limited to, custom prepared data such as fabrication and erection/installation drawings, scheduled information, setting diagrams, actual shop work manufacturing instructions, individual system or equipment inspection and test reports, including performance curves and certifications, as applicable to the work.

B. The Contractor shall submit a minimum of six (6) hardcopies and one (1) electronic copy of all shop drawings. Four (4) of the hardcopies will be retained by the Engineer.

C. All shop drawings submitted by subcontractors for approval shall be sent directly to the Contractor for checking. The Contractor shall be responsible for their submission at the proper time so as to prevent delays in delivery of materials.

D. The Contractor shall check all subcontractor's shop drawings regarding measurements, size of materials and details to verify that the drawings conform to the intent of the Plans and Specifications. Drawings submitted by the subcontractor found to be inaccurate or otherwise in error shall be returned to the subcontractor for correction before submission thereof.

E. The Contractor shall make any corrections required by the Engineer and shall resubmit five (5) corrected hardcopies and one (1) electronic copy of shop drawings until fully reviewed and approved.

F. The Engineer's review and comments on shop drawings shall not relieve the Contractor of responsibility for any deviation from the requirements of the Contract Documents.

G. Clearly show the relation of the various parts, and where the Work depends upon field measurements, make measurements and include them on the Shop Drawings before submitting to Engineer.

H. Reference all submissions to clearly indicate the Specification Section, location, service, and function of each particular item. Submissions for a single item, or group of related items, shall be complete. When submitting manufacturers' catalogs, pamphlets or other data

sheets, in lieu of prepared Shop Drawings, specifically identify in ink the items for which acceptance is being sought.

I. If the Shop Drawings contain any departures from the Contract requirements, specifically describe them in Contractor's letter of transmittal. Where such departures require revisions to layouts or changes to the Work as shown, Contractor shall, at the Contractor's own expense, prepare and submit revised drawings. Make drawings the same size as the Contract Drawings.

3.07 SAMPLES AND PRODUCT DATA

A. Product data as specified in individual sections include, but are not limited to, standard prepared data for manufactured products such as the manufacturer's product specification and installation instructions, manufacturer's printed statements of compliance and applicability, roughing-in diagrams and templates, catalog cuts, product photographs, printed performance curves, production or quality control inspection and test reports and certifications, mill reports, product operating and maintenance instructions and printed product warranties, as applicable to the work.

B. Samples specified in individual sections include, but are not limited to, physical examples of the work such as sections of manufactured or fabricated work, small cuts or containers of materials, and units of work to be used by the Engineer or Owner for independent inspection and testing, as applicable to the work.

C. Samples shall be marked clearly to show:
   1. Name or trade, type quality or grade and any further designation necessary to identify the items or materials.
   2. Manufacturer's or producer's name.
   3. Name of Contractor and subcontractor, if any.
   4. Name and number of project.

D. Submit samples of such size and/or number sufficient to show quality, type, range of color, finish and texture.

E. Materials furnished shall be equal to approved samples.

F. Manufacturer's product data sheets that include multiple types, models and sizes shall have the proposed items highlighted.

3.08 OPERATION AND MAINTENANCE DATA

A. See Section 01782.

B. Complete and submit duplicate copies of the attached "Equipment Record Sheet" for each piece of motor driven equipment.

3.09 SPARE PARTS

A. For each item, provide a list of parts and supplies that are normally furnished at no extra cost or are specified to be furnished under this Contract, and a separate list of additional items which manufacturer recommends having "on hand" in order to ensure efficient and proper operation for the first year of service.

3.010 INSTALLATION - APPLICATION INSTRUCTIONS

A. Submit copies of all manufacturers' application instructions and turn over to the Resident Project Representative, all printed instructions and labels which are attached to or shipped with equipment and materials. These documents are, in many cases, valuable to Owner in their operation and maintenance program.

3.011 COLORS - PATTERNS

A. Unless the precise color and pattern are specified, whenever a choice of color or pattern is available in a specified product, submit accurate color and pattern charts for Engineer's and Owner's review and selection.

B. Unless all available colors and patterns have identical costs and identical wearing capabilities, and are identically suited for the installation, completely describe the relative costs and capabilities of each.

3.012 MANUFACTURERS' SERVICE STATIONS

A. The product of a manufacturer who does not maintain an adequate service station and a sufficient stock or spare parts in a reasonable vicinity of the Project, is subject to rejection by Engineer solely on that basis. With each submission, submit information on manufacturers' capabilities, and a general idea of the stock of spare parts available.

3.013 TEST RESULTS AND INSTALLATION

A. Whenever tests are required on materials and equipment, such tests shall be performed and 2 copies of the test results submitted to Engineer. Contract shall not deliver to the Project or incorporate into the Work any materials or equipment for which Engineer has not issued a written acceptance of the required tests and test results.

3.014 APPROVAL OF MATERIALS

A. Only new materials shall be incorporated in the work. All materials and equipment furnished by the Contractor shall be subject to the inspection and approval of the Engineer.

B. Any delay of approval resulting from the Contractor's failure to submit samples or data promptly shall not be used as basis of a claim against the Owner or the Engineer.

C. The materials and equipment used on the work shall correspond to the approved samples or other data.

END OF SECTION

EQUIPMENT RECORD SHEET

For _____

EQUIPMENT MANUFACTURER

Tel.

Type

Model No.

Serial No.

Capacity _____ @

SPECIAL NOTES AND REMARKS:

SERVICE REPRESENTATIVE

Tel.

Motor Mfr.

Motor Size _____ hp Type
Volts _____ Amps
Phase _____ Cycles _____ RPM
Frame

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Date: _____

To: Fuss & O'Neill, Inc.

From:
One Financial Plaza, 15th Floor
Hartford, CT 06103
ATTN: Mr. Albert Wait, E.I.T.

PROJECT: _____ SUBMITTAL NO.: _____

(List Section No., Article No., Paragraph)

_____

_____

_____

(Revision: 1st, 2nd, 3rd, etc.)

Transmitted herewith for review and comment are the following:

Copies	Dwg.	No.	Description

MANUFACTURER / SUPPLIER

Name: _____

Address: _____

Telephone No.: _____ Facsimile No.: _____

For Additional Information, Contact _____

_____

E-mail Address:

I hereby certify that I have carefully examined the enclosed submittal and have determined and verified all field measurements, construction criteria, materials, catalog numbers and similar data, coordinated the submittal with other submissions and the work of other trades and contractors, and that to the best of my knowledge and belief, the enclosed submittal is in full compliance with the Contract Documents, except for the following deviations:

BY:

Signature: Date: _____

Title: _____

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-- SAMPLE --

MANUFACTURER'S LETTERHEAD

C E R T I F I C A T E O F C O M P L I A N C E

Date _____, 20

WE HEREBY CERTIFY THAT

(Description, Kind of Material, Model No., etc.)

FURNISHED TO

(Name of Contractor) (Prime or Subcontractor)

FOR USE ON

(Project Name)

PROJECT NO. _____ OWNER

In the Amount of

(Quantity Represented)

Identified by

(Label, Marking, Seal No., Consignment, or Waybill No.)

Shipped on _____, 20___, Delivered on _____, 20

Shipped Via

(Method of Shipment, Car No., Truck No.)

MEETS THE REQUIREMENTS OF THE CONTRACT DOCUMENTS FOR THE SUBJECT PROJECT IN ALL RESPECTS. PROCESSING, PRODUCT TESTING AND INSPECTION CONTROL OF RAW MATERIALS ARE IN CONFORMANCE WITH ALL APPLICABLE SPECIFICATIONS, DRAWINGS AND/OR STANDARDS OF ALL ARTICLES FURNISHED. ARTICLES FURNISHED COMPLY WITH THE FOLLOWING STANDARD SPECIFICATIONS:

All records and documents pertinent to this certificate and not submitted herewith will be maintained available by the undersigned for a period of not less than three years from the date of this certificate.

(Manufacturer)

Signed by
Title

SECTION 01 40 00
QUALITY REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Submittals.

B. Quality assurance.

C. Testing and inspection agencies and services.

D. Control of installation.

E. Defect Assessment.

1.02 RELATED REQUIREMENTS

A. Section 01 30 00 - Administrative Requirements:

B. Section 01 60 00 - Product Requirements:

1.03 REFERENCE STANDARDS

A. IAS AC89 - Accreditation Criteria for Testing Laboratories; 2018.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Design Data: Submit for Engineer's knowledge as contract administrator for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents, or for Owner's information.
   1. Include calculations that have been used to demonstrate compliance to performance and regulatory criteria provided, and to determine design solutions.
   2. Include required product data and shop drawings.
   3. Include a statement or certification attesting that design data complies with criteria indicated, such as building codes, loads, functional, and similar engineering requirements.
   4. Include signature and seal of design professional responsible for allocated design services on calculations and drawings.

C. Test Reports: After each test/inspection, promptly submit two copies of report to Engineer and to Contractor.
   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. Compliance with Contract Documents.
      k. When requested by Engineer, provide interpretation of results.
   2. Test report submittals are for Engineer's knowledge as contract administrator for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents, or for Owner's information.

D. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Contractor or installation/application subcontractor to Engineer, in quantities specified for Product Data.

1. Indicate material or product complies with 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.

E. Manufacturer's Instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, for the Owner's information. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

F. Manufacturer's Field Reports: Submit reports for Engineer's benefit as contract administrator or for Owner.
1. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents.

G. Erection Drawings: Submit drawings for Engineer's benefit as contract administrator or for Owner.
1. Submit for information for the limited purpose of assessing compliance 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 QUALITY ASSURANCE

A. Testing Agency Qualifications:
1. Prior to start of work, submit agency name, address, and telephone number, and names of full-time registered Engineer and responsible officer.
2. Submit copy of report of laboratory facilities inspection made by NIST Construction Materials Reference Laboratory during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.
3. Qualification Statement: Provide documentation showing testing laboratory is accredited under IAS AC89.

1.06 TESTING AND INSPECTION AGENCIES AND SERVICES

A. Contractor shall employ and pay for services of an independent testing agency to perform other 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. Laboratory: Authorized to operate in the State in which the Project is located.
2. Testing Equipment: Calibrated at reasonable intervals either by NIST or using an established NIST 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 TESTING AND INSPECTION

A. Testing Agency Duties:
   1. Provide qualified personnel at site. Cooperate with Engineer and Contractor in performance of services.
   2. Perform specified sampling and testing of products in accordance with specified standards.
   3. Ascertain compliance of materials and mixes with requirements of Contract Documents.
   4. Promptly notify Engineer and Contractor of observed irregularities or non-compliance of Work or products.
   5. Perform additional tests and inspections required by Engineer.
   6. Submit reports of all tests/inspections specified.

B. Limits on Testing/Inspection 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.

C. 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/inspected.
      b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
      c. To facilitate tests/inspections.
      d. To provide storage and curing of test samples.
   4. Notify Engineer and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
   5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
   6. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.

D. Re-testing required because of non-compliance with specified requirements shall be performed by the same agency on instructions by Engineer.

E. Re-testing required because of non-compliance with specified requirements shall be paid for by Contractor.

3.03 DEFECT ASSESSMENT

A. Replace Work or portions of the Work not complying with specified requirements.

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SECTION 01 50 00
TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Dewatering

B. Waste removal facilities and services.

C. Project identification sign.

D. Field offices.

1.02 RELATED REQUIREMENTS

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

1.03 DEWATERING

A. Provide temporary means and methods for dewatering all temporary facilities and controls.

B. Maintain temporary facilities in operable condition.

1.04 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.

C. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.

D. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

1.05 PROJECT IDENTIFICATION

A. Erect on site at location established by Engineer.

B. No other signs are allowed without Owner permission except those required by law.

1.06 SUMMARY

A. This Section includes requirements for temporary facilities and controls, including temporary utilities, support facilities, and security and protection facilities.

B. Temporary utilities include, but are not limited to, the following:
   1. Sanitary facilities, including toilets, wash facilities, and drinking-water facilities.
   2. Electric power service.
   3. Telephone service.
   4. Internet and Wi-Fi service.

C. Support facilities include, but are not limited to, the following:
   1. Temporary roads and paving.
   2. Dewatering facilities and drains.
   3. Project identification and temporary signs.
   4. Waste disposal facilities.
   5. Engineer field office.
      a. Provide one field office for use by Engineer for duration of Contract.

D. Security and protection facilities include, but are not limited to, the following:
   1. Environmental protection.
   2. Stormwater control.
   3. Tree and plant protection.
   4. Barricades, warning signs, and lights.

1.07 USE CHARGES

A. General: Cost or use charges for temporary facilities are not chargeable to Owner or Engineer and shall be included in the Work. Allow other entities to use temporary services and facilities without cost, including, but not limited to, the following:
   1. Owner.
   2. Engineer.
   3. Testing agencies.
   4. Personnel of authorities having jurisdiction.

B. Sewage Disposal Service: Pay sewage disposal service use charges for sewage disposal from Project site.

C. Potable Water Service: Pay potable water service use charges, whether metered or otherwise, for water used in construction activities at Project site.

D. Electric Power Service: Pay electric power service use charges, whether metered or otherwise, for electricity used by in construction activities at Project site.

E. Telephone Service: Pay for telephone service use charges, for office telephones at Project site.

F. Internet Service: Pay internet and Wi-Fi service use charges, for office at Project site.

1.08 QUALITY ASSURANCE

A. Standards: Comply with ANSI A10.6, NECA's "Temporary Electrical Facilities," and NFPA 241.

B. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

C. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.09 FIELD OFFICES

A. Office: Weathertight, with lighting, electrical outlets, heating, cooling equipment, and equipped with sturdy furniture, drawing rack, and drawing display table.

B. Provide space for Project meetings, with table and chairs to accommodate 6 persons.

C. Locate offices a minimum distance of 30 feet from existing and new structures.

1.10 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Remove temporary utilities, equipment, facilities, materials, prior to Date of Substantial Completion inspection.

B. Remove underground installations to a minimum depth of 2 feet. Grade site as indicated.

C. Clean and repair damage caused by installation or use of temporary work.

D. Restore existing facilities used during construction to original condition.

PART 2 PRODUCTS

2.01 MATERIALS

A. General: Provide new materials. Undamaged, previously used materials in serviceable condition may be used if approved by Engineer. Provide materials suitable for use intended.

B. Pavement: Comply with Section "Bituminous Concrete Paving."

C. Water: Potable.

2.02 EQUIPMENT

1. General: Provide equipment suitable for use intended.
   a. Provide separate field office for use by Engineer.
   b. Provide self-contained toilet unit for exclusive use of Engineer.
2. Field Offices: Prefabricated mobile units with lockable entrances, operable windows, and serviceable finishes; thermostatically controlled heat and air conditioning.
   a. Heating: Maintain minimum temperature of 68 degrees F.

b. Cooling: Maintain maximum temperature of 72 degrees F.

3. Fire Extinguishers: Hand carried, portable, UL rated. Provide class and extinguishing agent as indicated or a combination of extinguishers of NFPA-recommended classes for exposures.
   a. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.
4. Self-Contained Toilet Units: Single-occupant units of chemical, aerated recirculation, or combustion type; vented; fully enclosed with a glass-fiber-reinforced polyester shell or similar non-absorbent material for the exclusive use of the Engineer.
5. Drinking-Water Fixtures: Containerized, tap-dispenser, bottled-water drinking-water units, including paper cup supply.
   a. Provide electric water coolers to maintain dispensed water temperature at 45 to 55 deg F.

PART 3 EXECUTION

3.01 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.

B. Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.02 TEMPORARY UTILITY INSTALLATION

A. General: Engage an appropriate local utility company to install temporary service or connect to existing service. Where utility company provides only part of the service, provide the remainder with matching, compatible materials and equipment. Comply with utility company requirements.
   1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
   2. Provide adequate capacity at each stage of construction. Before temporary utility is available, provide trucked-in services.
   3. Obtain easements to bring temporary utilities to Project site where Owner's easements cannot be used for that purpose.

B. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking-water fixtures. Comply with regulations and health codes for type, number, location, operation, and maintenance of fixtures and facilities.
   1. Disposable Supplies: Provide toilet tissue, paper towels, paper cups, and similar disposable materials for each facility. Maintain adequate supply. Provide covered waste containers for disposal of used material.
   2. Toilets: Install self-contained toilet units. Shield toilets to ensure privacy.

C. Electric Power Service: Provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics during construction period for the Engineer’s office. Include meters, transformers, overload-protected disconnecting means, automatic ground-fault interrupters, and main distribution switchgear.
   1. Install power distribution wiring overhead and rise vertically where least exposed to damage.

D. Telephone Service: Provide temporary telephone service throughout construction period for the Engineer’s office. Install separate telephone lines for telephone and fax service.
   1. Provide Frontier voice-mail service or an answering machine for Engineer’s telephone service.
   2. Provide a portable cellular telephone for Contractor's superintendent use in making and receiving telephone calls when away from field office. Include voice mail with cellular service.
   3. Provide fax machine with supply of paper for duration of construction.

E. Internet Service: Provide high speed internet connection service for Engineer's service.

3.03 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:
   1. Locate field offices, storage sheds, sanitary facilities, and other temporary construction and support facilities for easy access. Obtain Town Planning and Zoning Commission and Inland Wetlands Agency approval for location.
   2. Maintain support facilities until near Substantial Completion. Remove before Substantial Completion.

B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate to support loads and to withstand exposure to traffic during construction period.
   1. Provide a reasonably level, graded, well-drained subgrade of satisfactory soil material, compacted to not less than 95 percent of maximum dry density in the top 6 inches.
   2. Provide gravel paving course of subbase material not less than 3 inches thick; roller compacted to a level, smooth, dense surface.
   3. Provide dust-control treatment that is nonpolluting and non-tracking. Reapply treatment as required to minimize dust.
   4. Provide parking area for minimum of 7 parking spaces.

C. Traffic Controls: Provide temporary traffic controls at junction of temporary roads with public roads. Include warning signs for public traffic and "STOP" signs for entrance onto public roads. Comply with requirements of authorities having jurisdiction.

D. Provide sedimentation control measures in accordance with Division 1 Section “Erosion and Sedimentation Control”

E. Dewatering Facilities and Drains: Comply with requirements in applicable Division 1 and Division 2 Sections for temporary drainage and dewatering facilities and operations not directly associated with construction activities included in individual Sections. Where feasible, use same facilities. Maintain Project site, excavations, and construction free of water.
   1. Dispose of rainwater and groundwater in a lawful manner that will not cause adverse impacts to the environment and that will not result in flooding Project or adjoining property nor endanger permanent Work or temporary facilities.
   2. Remove snow and ice as required to minimize accumulation.

F. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Containerize and clearly label hazardous, dangerous, or unsanitary waste materials separately from other waste. Comply with Division 1 Section "Execution Requirements" for progress cleaning requirements.
   1. If required by authorities having jurisdiction, provide separate containers, clearly labeled, for each type of waste material to be deposited.
   2. Develop a waste management plan for Work performed on Project. Indicate types of waste materials Project will produce and estimate quantities of each type. Provide detailed information for on-site waste storage and separation of recyclable materials. Provide information on destination of each type of waste material and means to be used to dispose of all waste materials.

G. Janitorial Services: Provide janitorial services on a weekly basis for Engineer’s office, toilets, wash facilities, and similar areas.

H. Engineer’s Field Office: Provide an insulated, weathertight, air-conditioned field office for use by the Engineer. Keep office clean and orderly. Provide weekly janitorial services.

I. Size: Sufficient to accommodate listed furniture without crowding but no less than 300 square feet.
   1. Windows: Three screened, operable windows with locks and curtains.
   2. Door: Cylinder lock with keys in quantity requested by Engineer.

J. Lighting: Overhead fluorescent lights.

K. Furnish and equip offices as follows:

1. Office Desk with Drawers: 3 feet by 5 feet. Enclosed over desk shelving with suitable clearance to stand 3-ring-binders vertically. Built-in desktops may be substituted.
   a. Quantity: Two.
2. Office Desk Chair: Upholstered, adjustable, executive swivel armchair with casters.
   a. Quantity: Two.
3. Desk Lighting: Fluorescent under-cabinet lighting for each unit.
4. Sloping Drafting Table: 3 feet by 6 feet with smooth top.
5. Drafting Table Chair: Upholstered, adjustable swivel chair with casters.
6. Folding Table: Eight feet long.
7. Folding Chairs: Upholstered seats.
   a. Quantity: Twelve.
8. Vertical Plan Rack: 8 binders minimum.
9. Metal Filing Cabinets: Fireproof, and lockable with key.
10. Four Drawer: Letter or legal size.
    a. Quantity: Two.
11. Broom and dust pan.
12. Waste baskets 30 gallon with plastic waste bags.
    a. Quantity: One.
13. Waste baskets 5 gallon with plastic waste bags.
    a. Quantity: Three.
14. Telephone and Telephone answering machine.
    a. Quantity: Two.
15. Hot and cold-water dispensing unit and supply of cups and bottled water.
16. Microwave and refrigerator.
17. Photocopying machine with supply of toner and paper for duration of construction. Provide repair service if needed.
18. Scanner and color printer with double-sided color printing compatible with the Engineer's computer system.
19. Fax Machine
20. Modem and wireless card for use with the Engineer's computer.
21. Portable presentation easel with a 2 feet by 3 feet board
22. Fire extinguishers: provide and install type and number to meet applicable state and local codes for size of office, provide fire extinguisher suitable for use on a computer terminal fire.

3.04 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects. Avoid using tools and equipment that produce harmful noise.

B. Stormwater Control: Provide earthen embankments and similar barriers in and around excavations and subgrade construction, sufficient to prevent flooding by runoff of stormwater from heavy rains.

C. Tree and Plant Protection: Install barrier fencing located as indicated or outside the drip line of trees to protect vegetation from construction damage. Protect tree root systems from damage, flooding, and erosion.

D. Barricades, Warning Signs, and Lights: Comply with standards and code requirements for erecting structurally adequate barricades. Paint with appropriate colors, graphics, and warning signs to inform personnel and public of possible hazard. Where appropriate and needed, provide lighting, including flashing red or amber lights.

3.05 OPERATION, TERMINATION, AND REMOVAL

A. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage caused by freezing temperatures and similar elements.

B. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facilities. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
   1. Materials and facilities that constitute temporary facilities are the property of Contractor.
   2. Remove temporary gravel access roads and temporary paving not intended for or acceptable for integration into permanent paving. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
   3. Remove temporary gravel access roads.
   4. At Substantial Completion, clean and renovate permanent facilities used during construction period. Comply with final cleaning requirements in Division 1 Section "Closeout Procedures."

END OF SECTION

SECTION 01 57 13
TEMPORARY EROSION AND SEDIMENT CONTROL

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of contract, including General and Supplementary Conditions and Division 01 specification Sections apply to the work of this Section.

1.02 SECTION INCLUDES

A. Prevention of erosion due to construction activities.

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

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

1.03 RELATED REQUIREMENTS

A. Section 31 00 00 - Earthwork

B. Section 31 10 00 - Site Clearing

C. Section 32 92 00 - Turf and Grasses:

1.04 REFERENCE STANDARDS

A. Connecticut Guidelines for Soil Erosion and Sediment Control by The Connecticut Council on Soil and Water Conservation.

B. ASTM D3786/D3786M - Standard Test Method for Bursting Strength of Textile Fabrics--Diaphragm Bursting Strength Tester Method; 2018.

C. ASTM D4355/D4355M - Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc-Type Apparatus; 2014 (Reapproved 2018).

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

E. ASTM D4533/D4533M - Standard Test Method for Trapezoid Tearing Strength of Geotextiles; 2015.

F. ASTM D4533/D4533M - Standard Test Method for Trapezoid Tearing Strength of Geotextiles; 2015.

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

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

I. ASTM D4833/D4833M - Standard Test Method for Index Puncture Resistance of Geomembranes, and Related Products; 2007 (Reapproved 2013).

J. ASTM D4873/D4873M - Standard Guide for Identification, Storage, and Handling of Geosynthetic Rolls and Samples; 2017.

K. Standard Specifications - Form 818 - State of Connecticut Department of Transportation Standard Specifications for Roads, Bridges and Incidental Construction; 2020.

1.05 PERFORMANCE REQUIREMENTS

A. 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.
   1. Obtain and pay for permits and provide security required by authority having jurisdiction.
   2. Owner will withhold payment to Contractor equivalent to all fines resulting from non-compliance with applicable regulations.

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

C. Stormwater Runoff: Control increased stormwater runoff due to disturbance of surface cover due to construction activities for this project.
   1. Prevent runoff into storm and sanitary sewer systems, including open drainage channels, in excess of actual capacity or amount allowed by authorities having jurisdiction, whichever is less.
   2. Anticipate runoff volume due to the most extreme short term and 24-hour rainfall events that might occur in 10 years.

D. Erosion On Site: Minimize wind, water, and vehicular erosion of soil on project site due to construction activities for this project.
   1. Control movement of sediment and soil from temporary stockpiles of soil.
   2. Prevent development of ruts due to equipment and vehicular traffic.
   3. If erosion occurs due to non-compliance with these requirements, restore eroded areas at no cost to Owner.

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

F. Sedimentation of Waterways On Site: Prevent sedimentation of waterways on the project site, including rivers, streams, lakes, ponds, open drainage ways, storm sewers, and sanitary sewers.
   1. If sedimentation occurs, install or correct preventive measures immediately at no cost to Owner; remove deposited sediments; comply with requirements of authorities having jurisdiction.
   2. If sediment basins are used as temporary preventive measures, pump dry and remove deposited sediment after each storm.

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

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

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

1.06 SUBMITTALS

A. 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.

B. Certificates of Compliance:
   1. Erosion Control Bales
   2. Catch Basin Inserts/Stormwater Inlet Protection
   3. Dewatering Bag
   4. Dust Control
   5. Stone or Gravel
   6. Polyethylene Film

C. Maintenance Instructions: Provide instructions covering inspection and maintenance for temporary measures that must remain after Substantial Completion.

PART 2 PRODUCTS

2.01 MATERIALS

A. General: See Drawings for materials and other required control measures.

B. Erosion Control Bales
   1. Bales: Air dry, rectangular hay or straw bales, weighing 40 to 120 pounds per bale.
      a. Bindings: Wire or string, around long dimension.
   2. Bale Stakes: One of the following, minimum 3 feet long:
      a. Wood, 2 by 2 inches in cross section.

C. Polyethylene Film:
   1. Thickness: as indicated on drawings

D. Catch Basin Inserts/Stormwater Inlet Protection
   1. Regular Flow Silt Sacks: Woven polypropylene that meets the following:

Properties	Test Method	Units
Grab Tensile Strength	ASTM D4632/D4632M	300 lbs.
Grab Tensile Elongation	ASTM D4632/D4632M	25 Percent
Puncture Strength	ASTM D4833/D4833M	120 lbs.
Trapezoid Tear	ASTM D4533/D4533M	120 lbs.
Flow Rate	ASTM D4491/D4491M	40 Gal/Min/Sq. Ft.
Permittivity	ASTM D4491/D4491M	0.55 sec-1
Mullen Burst	ASTM D3786/D3786M	800 psi
UV Resistance	ASTM D4355/D4355M	80 Percent
Apparent Opening Size	ASTM D4751	#40 US Sieve

   2. Acceptable Products and Manufacturers:
      a. Regular Flow Siltsack, ACF Environmental, Richmond, VA 23237 (800-844-9223).
      b. U.S. Silt & Site Supply, P.O. Box 2461, Concord, NH 03302, Model CB2448CT.
      c. Or approved equal.

E. Silt Fence:
   1. Silt Fence Fabric: Woven 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:
   2. Average Opening Size: 30 U.S. Std. Sieve, maximum, when tested in accordance with ASTM D4751.
   3. Permittivity: 0.05 sec^-1, minimum, when tested in accordance with ASTM D4491/D4491M.
   4. Ultraviolet Resistance: Retaining at least 80 percent of tensile strength, when tested in accordance with ASTM D4355/D4355M after 500 hours exposure.
   5. Tensile Strength: 100 pounds-force, minimum, in cross-machine direction; 124 pounds-force, minimum, in machine direction; when tested in accordance with ASTM D4632/D4632M.
   6. Elongation: 15 to 20 percent, when tested in accordance with ASTM D4632/D4632M.
   7. Tear Strength: 50 pounds-force, minimum, when tested in accordance with ASTM D4533/D4533M.
   8. Flow Rate: 8 gal/min/ft, minimum, when tested in accordance with ASTM D4491/D4491M.
   9. Color: Manufacturer's standard, with embedment and fastener lines preprinted.
   10. Acceptable Products and Manufacturers:
      a. U.S. Silt & Site Supply/GETSco, Model CT36112130.
      b. Indian Valley Industries, Model IVI CT-3611 Connecticut DOT Silt Fence.

c. Mutual Industries Inc., Model MISF 1855.

11. Silt Fence Posts: One of the following, minimum 4 feet long:
    a. Hardwood, 1-1/2 by 1-1/2 inches in cross section.

F. Dewatering Bag
1. Filter Bag (Silt Bag): Manufactured non-woven geotextile fabric bag, sewn with high-strength thread, with a spout to accommodate a 4-inch discharge hose (maximum), and attached straps.
2. Non-woven Geotextile Fabric:

Properties	Test Method	Units
Grab Tensile Strength	ASTM D4632/D4632M	200 lbs.
Puncture	ASTM D4833/D4833M	165 lbs.
Flow Rate	ASTM D4491/D4491M	70 Gal/Min/Sq. Ft.
Permittivity	ASTM D4491/D4491M	1.3 sec-1
Mullen Burst	ASTM D3786/D3786M	550 psi
UV Resistance	ASTM D4355/D4355M	70 percent
Apparent Opening Size	ASTM D4751	#40 US Sieve
Percent Retained		100 percent

3. Acceptable Products and Manufacturers:
    a. Dirtbag® by ACF Environmental, Richmond, VA.
    b. Dandy Dewatering Bag by Dandy Products, Inc., Dublin, OH.
    c. Or approved equal.

G. Dust Control
1. Calcium Chloride: ASTM D98, Type 1 or Type 2.
2. Water: Potable.

H. Construction Entrance
1. Stone or Gravel: Standard Specifications - Form 818, Section M.01.02, 2" or No. 3.

I. Riprap for Pumping Settling Basin
1. Modified Riprap: Standard Specifications - Form 818, Section M.12.02.

J. Filter Fabric and Separation Fabric
1. See Section 31 23 00 - Earthwork

PART 3 EXECUTION

3.01 GENERAL

A. Minimize environmental damage during construction. Prevent discharge of fuel, oil, lubricants, and other fluids. Mitigate effects of discharge.

B. Install erosion and sediment control measures prior to clearing, demolition or construction.

C. Construct erosion and sediment control measures in accordance with standards and specifications of the Connecticut Guidelines for Soil Erosion and Sediment Control, Authorities Having Jurisdiction, indicated municipal regulations, and as follows:
1. Attend a preconstruction meeting with the Engineer, to review permit conditions and construction methods.
2. Provide additional sedimentation and erosion controls as required by municipality or Authorities Having Jurisdiction to address field conditions.
3. Do not discharge turbid water from dewatering to inland wetlands or watercourses.
4. Supply a 24-hour contact name and number as part of the erosion control plan.

D. Install additional control measures, if deemed necessary by the State, Municipality, Authority Having Jurisdiction, or Owner.

E. Implement and maintain the Erosion and Sediment Control Plan. Inform parties engaged on the construction site of the requirements and objectives of the plan. Notify the proper municipal agency of transfer of this responsibility.

F. Do not discharge directly into wetlands or watercourses where dewatering is necessary. Utilize methods and devices as permitted by authorities having jurisdiction and appropriate regulations to minimize and retain suspended solids including pumping water into a temporary sedimentation bowl, providing surge protection at inlet and outlet of pumps, floating pump intake.
   1. If pumping operation results in turbidity problems, stop pumping until means of controlling turbidity are determined and implemented.

3.02 EXAMINATION

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

3.03 PREPARATION

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

3.04 SCOPE OF PREVENTIVE MEASURES

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

B. See Drawings for scope and extent of required erosion and sediment control measures.

C. Construction Entrances: Traffic-bearing aggregate surface.
   1. Width: As required; 12 feet, minimum.
   2. Length: 50 feet, minimum.
   3. Provide at each construction entrance from public right-of-way.
   4. Where necessary to prevent tracking of mud onto right-of-way, provide wheel washing area out of direct traffic lane, with drain into sediment trap or basin.

D. Linear Sediment Barriers: Made of silt fence or erosion control bales.
   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 traverse disturbed areas.
      c. Along the toe of cut slopes and fill slopes.
      d. Perpendicular to flow across the bottom of existing and new drainage channels and swales that traverse disturbed areas or carry runoff from disturbed areas; space as indicated on Drawings.
      e. Across the entrances to culverts that receive runoff from disturbed areas.
   2. Space sediment barriers with the following maximum slope length upslope from barrier:

Slope	Maximum Length (ft)
2:1	25
2:1 to 3:1	50
3:1 to 5:1	75
5:1 or flatter	100

   3. Where control measures are required for longer than 60 days, use silt fence instead of erosion control bales.

E. Cut Areas
   1. Establish an erosion control line (silt fence or erosion control bale check) at toe of slope in cut areas and slope stabilization with mulch or grass within 30 days of start of cut operations.

F. Fill Areas

1. Establish an erosion control line (silt fence or erosion control bale check) approximately 10 feet from toe of slope of proposed fill areas prior to beginning fill installation.
2. Initiate slope stabilization with mulch or grass within 30 days of start of fill installation.

G. Within 7 days of completing slope construction, stabilize slopes with vegetation or matting to minimize exposure.

H. Stockpiles
1. Where indicated stockpile soil entirely on polyethylene film.
2. Side Slopes: 2:1 maximum.
3. Where indicated cover stockpiles with polyethylene film and secure by placing hay bales on outer edges.
4. Where indicated surround stockpiles by a sediment barrier.
5. Where indicated stabilize stockpiles that are not to be used within 30 days with temporary vegetation and mulch.

I. Final Grading
1. If final grading is delayed for more than 30 days after land disturbances cease, stabilize soils with temporary vegetation or mulch.

J. Planting Season for Temporary Vegetation
1. April 1 to June 15 and August 15 to October 1.
2. After September 15, stabilize areas with silt fence or erosion control bale check.

K. Areas to Be Left Bare Prior to Finished Grading and Seeding
1. Within Planting Seasons
   a. Provide temporary seed.
2. Outside of Planting Seasons
   a. Provide mulch.

3.05 INSTALLATION

A. General: Install temporary erosion and sediment controls as indicated on Drawings.

B. Silt Fences:
1. Store and handle fabric in accordance with ASTM D4873/D4873M.
2. Install with top of fabric at nominal height and embedment indicated on drawings.
3. Do not splice fabric width; minimize splices in fabric length; splice at post only, overlapping at least 18 inches, with extra post.
4. Fasten fabric to wood posts using one of the following:
   a. Four nails per post with 3/4-inch diameter flat or button head, 1 inch long, and 14-gauge, 0.083-inch shank diameter.
   b. Five staples per post with at least 17-gauge, 0.0453-inch wire, 3/4-inch crown width and 1/2-inch-long legs.
5. Wherever runoff will flow around end of barrier or over the top, provide temporary splash pad or other outlet protection; at such outlets in the run of the barrier, make barrier not more than 12 inches high with post spacing not more than 4 feet.

C. Erosion Control Bale Rows:
1. Install bales in continuous rows with ends butting tightly, with one bale at each end of row turned uphill.
2. Install bales so that bindings are not in contact with the ground.
3. Embed bales at least 4 inches in the ground.
4. Anchor bales with at least two stakes per bale, driven at least 18 inches into the ground; drive first stake in each bale toward the previously placed bale to force bales together.
5. Fill gaps between ends of bales with loose straw wedged tightly.
6. Place soil excavated for trench against bales on the upslope side of the row, compacted.

D. Catch Basin Inserts/Stormwater Inlet Control

1. Protect catch basins with catch basin inserts throughout construction until disturbed areas are stabilized.
2. Remove catch basin grate, insert silt sack, and secure in place by replacing grate.

E. Temporary Soil Protection
   1. Mulches:
      a. Dry Straw: Apply 2-1/2 tons per acre; anchor using water soluble tactifiers or netting.

F. Temporary Seeding:
   1. When hydraulic seeder is used, seedbed preparation is not required.
   2. When surface soil has been sealed by rainfall or consists of smooth undisturbed cut slopes, and conventional or manual seeding is to be used, prepare seedbed by scarifying sufficiently to allow seed to lodge and germinate.
   3. If temporary mulching was used on planting area but not removed, apply nitrogen fertilizer at 1 pound per 1000 sq ft.
   4. On soils of very low fertility, apply 10-10-10 fertilizer at rate of 12 to 16 pounds per 1000 sq ft.
   5. Incorporate fertilizer into soil before seeding.
   6. Apply seed uniformly; if using drill or cultipacker seeders place seed 1/2 to 1 inch deep.
      a. Temporarily seed with Perennial Ryegrass
      b. Apply at a rate of 2 pounds per 1000 sq. ft. at a depth of 1/2 inch.
      c. Where grass predominates, fertilize according to a soil test at a minimum application rate of one pound per acre.
   7. Irrigate as required to thoroughly wet soil to depth that will ensure germination, without causing runoff or erosion.
   8. Repeat irrigation as required until grass is established.

3.06 DUST CONTROL

A. Control dust to prevent a hazard to traffic on adjacent roadways. Apply water and calcium chloride uniformly over the surface when dust becomes a nuisance or when directed by the Engineer.
   1. Provide shut-off valve in convenient location on water truck, to allow for regulating water flow.

3.07 MAINTENANCE

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

B. Repair deficiencies immediately.

C. Silt Fences:
   1. Promptly replace fabric that deteriorates unless need for fence has passed.
   2. Remove silt deposits that exceed one-half of the height of the fence.
   3. Repair fences that are undercut by runoff or otherwise damaged, whether by runoff or other causes.

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

E. Dewatering Bag Maintenance
   1. Maintain in good condition throughout construction period.

F. Catch Basin Inserts/Stormwater Inlet Control
   1. Remove, clean, and reinstall silt sack when sediment accumulates to half capacity of sack.

G. Construction Entrance Maintenance

1. Maintain in good condition throughout construction period.
2. Sweep adjacent roadways daily to remove tracked material from pavement.

H. Clean out temporary sediment control structures weekly and relocate soil on site.

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

3.08 CLEAN UP

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

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

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

END OF SECTION

SECTION 01 60 00
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.

F. Maintenance materials, including extra materials, spare parts, tools, and software.

1.02 RELATED REQUIREMENTS

A. Section 01 26 00 – Contract Modification Procedures

B. Section 01 40 00 - Quality Requirements

C. Section 01 74 19 - Construction Waste Management and Disposal:

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 Agreement.
   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.

PART 2 PRODUCTS

2.01 EXISTING PRODUCTS

A. Do not use materials and equipment removed from existing premises unless specifically required or permitted by Contract Documents.

B. Unforeseen historic items encountered remain the property of the Owner; notify Owner promptly upon discovery; protect, remove, handle, and store as directed by Owner.

2.02 NEW PRODUCTS

A. Provide new products unless specifically required or permitted by Contract Documents.

B. See Section 01 40 00 - Quality Requirements, for additional source quality control requirements.

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 Project site; obtain receipt prior to final payment.

PART 3 EXECUTION

3.01 SUBSTITUTION LIMITATIONS

A. See Section 01 25 00 - Substitution Procedures.

3.02 TRANSPORTATION AND HANDLING

A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.

B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.

C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.

D. Transport and handle products in accordance with manufacturer's instructions.

E. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.

F. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.

G. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.

H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.03 STORAGE AND PROTECTION

A. Provide protection of stored materials and products against theft, casualty, or deterioration.

B. 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. See Section 01 74 19.

1. Structural Loading Limitations: Handle and store products and materials so as not to exceed static and dynamic load-bearing capacities of project floor and roof areas.

C. Store and protect products in accordance with manufacturers' instructions.

D. Store with seals and labels intact and legible.

E. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.

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

G. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.

H. Comply with manufacturer's warranty conditions, if any.

I. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.

J. Prevent contact with material that may cause corrosion, discoloration, or staining.

K. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

L. 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

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SECTION 01 70 00
EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Examination, preparation, and general installation procedures.

B. Cutting and patching.

C. Cleaning and protection.

D. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.

E. General requirements for maintenance service.

1.02 RELATED REQUIREMENTS

A. Section 01 10 00 - Summary: Limitations on working in existing building; continued occupancy; work sequence; identification of salvaged and relocated materials.

B. Section 01 30 00 - Administrative Requirements: Submittals procedures, Electronic document submittal service.

C. Section 01 78 00 - Closeout Submittals

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. 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.

1.04 COORDINATION

A. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.

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

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

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

E. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.

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

G. 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.

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 60 00 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

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

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

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

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

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

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

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

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

3.03 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.

3.04 CUTTING AND PATCHING

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

B. 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-complying work.

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

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

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

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

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

H. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with manufacturer's recommendations to full thickness of the penetrated element.

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.

3.05 PROGRESS CLEANING

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

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

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

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

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

3.07 ADJUSTING

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

3.08 FINAL CLEANING

A. Use cleaning materials that are nonhazardous.

B. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.

C. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.

D. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.

E. Clean filters of operating equipment.

F. Clean debris from roofs, gutters, downspouts, scuppers, overflow drains, area drains, and drainage systems.

G. Clean site: sweep paved areas, rake clean landscaped surfaces.

H. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

3.09 CLOSEOUT PROCEDURES

A. Make submittals that are required by governing or other authorities.

B. Accompany Project Coordinator on preliminary inspection to determine items to be listed for completion or correction in the Contractor's Correction Punch List for Contractor's Notice of Substantial Completion.

C. Notify Engineer when work is considered ready for Engineer's Substantial Completion inspection.

D. Submit written certification containing Contractor's Correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Engineer's Substantial Completion inspection.

E. Conduct Substantial Completion inspection and create Final Correction Punch List containing Engineer's and Contractor's comprehensive list of items identified to be completed or corrected and submit to Engineer.

F. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Owner-occupied areas.

G. Notify Engineer when work is considered finally complete and ready for Engineer's Substantial Completion final inspection.

H. Complete items of work determined by Engineer listed in executed Certificate of Substantial Completion.

3.10 MAINTENANCE

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

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

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

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

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

END OF SECTION

SECTION 01 74 19
CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 GENERAL

1.01 WASTE MANAGEMENT REQUIREMENTS

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

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

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

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

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

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

1.02 DEFINITIONS

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

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

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 WASTE MANAGEMENT PROCEDURES

A. See Section 01 30 00 for additional requirements for project meetings, reports, submittal procedures, and project documentation.

B. See Section 01 50 00 for additional requirements related to trash/waste collection and removal facilities and services.

C. See Section 01 60 00 for waste prevention requirements related to delivery, storage, and handling.

D. See Section 01 70 00 for trash/waste prevention procedures related to demolition, cutting and patching, installation, protection, and cleaning.

3.02 WASTE MANAGEMENT PLAN IMPLEMENTATION

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

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

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

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

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

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

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

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

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

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SECTION 01 78 00
CLOSEOUT SUBMITTALS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Project record documents.

B. Operation and maintenance data.

C. Warranties and bonds.

1.02 RELATED REQUIREMENTS

A. Section 01 30 00 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.

B. Individual Product Sections: Specific requirements for operation and maintenance data.

C. 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.

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. Addenda.
   3. Change Orders and other modifications to the Contract.
   4. Reviewed shop drawings, product data, and samples.
   5. 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. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:

1. Measured depths of foundations in relation to finish first floor datum.
2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
4. Field changes of dimension and detail.
5. Details not on original Contract drawings.

3.02 OPERATION AND MAINTENANCE DATA

A. Source Data: For each product or system, list names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.

B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.

D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

3.03 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES

A. For Each Product, Applied Material, and Finish:

B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.

C. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

3.04 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. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

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, shutdown, 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. Include test and balancing reports.

K. Additional Requirements: As specified in individual product specification sections.

3.05 ASSEMBLY OF OPERATION AND MAINTENANCE MANUALS

A. Assemble operation and maintenance data into durable manuals for Owner's personnel use, with data arranged in the same sequence as, and identified by, the specification sections.

B. Where systems involve more than one specification section, provide separate tabbed divider for each system.

C. 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.

D. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.

E. Project Directory: Title and address of Project; names, addresses, and telephone numbers of Engineer, Consultants, Contractor and subcontractors, with names of responsible parties.

F. Tables of Contents: List every item separated by a divider, using the same identification as on the divider tab; where multiple volumes are required, include all volumes Tables of Contents in each volume, with the current volume clearly identified.

G. Dividers: Provide tabbed dividers for each separate product and system; identify the contents on the divider tab; immediately following the divider tab include a description of product and major component parts of equipment.

H. Text: Manufacturer's printed data, or typewritten data on 20-pound paper.

I. Drawings: Provide with reinforced punched binder tab. Bind in with text, fold larger drawings to size of text pages.

J. Arrangement of Contents: Organize each volume in parts as follows:
   1. Project Directory.
   2. Table of Contents, of all volumes, and of this volume.
   3. Operation and Maintenance Data: Arranged by system, then by product category.
      a. Source data.
      b. Product data, shop drawings, and other submittals.
      c. Operation and maintenance data.
      d. Field quality control data.
      e. Photocopies of warranties and bonds.

3.06 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 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.

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SECTION 01 78 23
OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
   1. Operation and maintenance documentation directory.
   2. Emergency manuals.
   3. Operation manuals for systems, subsystems, and equipment.
   4. Maintenance manuals for the care and maintenance of products, materials, finishes, components, or systems.

B. Related Sections include the following:
   1. Section 01 33 00 – Submittal Procedures: For submitting copies of submittals for operation and maintenance manuals.
   2. Section 01 78 00 – Closeout Procedures: For submitting operation and maintenance manuals.
   3. Divisions 2 through 50 Sections for specific operation and maintenance manual requirements for products in those Sections.

1.03 DEFINITIONS

A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.

B. Subsystem: A portion of a system with characteristics similar to a system.

1.04 SUBMITTALS

A. Initial Submittal: Submit (4) four draft copies of each manual at least 15 days before starting the proposed equipment. Include a complete operation and maintenance directory. Engineer will return 1 copy of draft and mark whether general scope and content of manual are acceptable.

B. Final Submittal: Submit 4 copies of each manual in final form at least 15 days before requesting substantial completion. Engineer will return copy with comments within 15 days after final inspection.
   1. Correct or modify each manual to comply with Engineer's comments as a revised Final Submittal. Submit 6 copies of each corrected manual within 15 days of receipt of Engineer's comments.

1.05 COORDINATION

A. Where operation and maintenance documentation includes information on installations by more than one factory-authorized service representative, assemble and coordinate information furnished by representatives and prepare manuals.

PART 2 - PRODUCTS

2.01 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

A. Organization: Include a section in the directory for each of the following:
   1. List of documents.
   2. List of systems.
   3. List of equipment.
   4. Table of contents.

B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.

C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.

D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with the same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

2.02 MANUALS, GENERAL

A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
1. Title page.
2. Table of contents.
3. Manual contents.

B. Title Page: Enclose title page in transparent plastic sleeve. Include the following information:
1. Subject matter included in manual.
2. Name and address of Project.
3. Name and address of Owner.
4. Date of submittal.
5. Name, address, and telephone number of Contractor.
6. Name and address of Engineer.
7. Cross-reference to related systems in other operation and maintenance manuals.

C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
1. Binders: Heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
    a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
    b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.
2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software diskettes for computerized electronic equipment.
4. Supplementary Text: Prepared on 8-1/2-by-11-inch, 20-lb/sq. ft. white bond paper.

5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
    a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
    b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.03 EMERGENCY MANUALS

A. Content: Organize manual into a separate section for each of the following:
    1. Type of emergency.
    2. Emergency instructions.
    3. Emergency procedures.

B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
    1. Fire.
    2. Flood.
    3. Gas leak.
    4. Water leak.
    5. Power failure.
    6. Water outage.
    7. System, subsystem, or equipment failure.
    8. Chemical release or spill.

C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.

D. Emergency Procedures: Include the following, as applicable:
    1. Instructions on stopping.
    2. Shutdown instructions for each type of emergency.
    3. Operating instructions for conditions outside normal operating limits.
    4. Required sequences for electric or electronic systems.
    5. Special operating instructions and procedures.

2.04 OPERATION MANUALS

A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
    1. System, subsystem, and equipment descriptions.
    2. Performance and design criteria if Contractor is delegated design responsibility.
    3. Operating standards.
    4. Operating procedures.
    5. Operating logs.
    6. Wiring diagrams.
    7. Control diagrams.
    8. Programmable Logic Controller code, configurations, tag database, communications configurations.
    9. Operator Interface Terminal screens, tag database, alarm database, communications configurations.
    10. SCADA Screens, tag database, communications driver configurations.
    11. VFD programmed parameters and electrical schematics.
    12. Piped system diagrams.
    13. Source Information (Bill-of-Materials)
    14. Instrument setup and configuration.
    15. Precautions against improper use.
    16. License requirements including inspection and renewal dates.

B. Descriptions: Include the following:
   1. Product name and model number.
   2. Manufacturer's name.
   3. Equipment identification with serial number of each component.
   4. Equipment function.
   5. Operating characteristics.
   6. Limiting conditions.
   7. Performance curves.
   8. Engineering data and tests.
   9. Complete nomenclature and number of replacement parts.

C. Sequence of Operations (Operating Procedures): Include the following, as applicable:
   1. Startup procedures.
   2. Equipment or system break-in procedures.
   3. Routine and normal operating instructions.
   4. Regulation and control procedures.
   5. Instructions on stopping.
   6. Normal shutdown instructions.
   7. Seasonal and weekend operating instructions.
   8. Required sequences for electric or electronic systems.
   9. Special operating instructions and procedures.
   10. Fault/Alarm instructions and procedures.
   11. Include results of Field Acceptance Tests for substantial completion.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed and identify color-coding where required for identification.

2.05 PRODUCT MAINTENANCE MANUAL

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Product Information: Include the following, as applicable:
   1. Product name and model number.
   2. Manufacturer's name.
   3. Color, pattern, and texture.
   4. Material and chemical composition.
   5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:
   1. Inspection procedures.
   2. Types of cleaning agents to be used and methods of cleaning.
   3. List of cleaning agents and methods of cleaning detrimental to product.
   4. Schedule for routine cleaning and maintenance.
   5. Repair instructions.
   6. Calibration and configuration procedures.
   7. Calibration and startup reports.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
   1. Include procedures to follow and required notifications for warranty claims.

2.06 SYSTEMS AND EQUIPMENT MAINTENANCE MANUAL

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

B. Source Information: List each system, subsystem, and piece of equipment included in the manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
   1. Standard printed maintenance instructions and bulletins.
   2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
   3. Identification and nomenclature of parts and components.
   4. List of items recommended to be stocked as spare parts.

D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
   1. Test and inspection instructions.
   2. Troubleshooting guide.
   3. Precautions against improper maintenance.
   4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
   5. Aligning, adjusting, and checking instructions.
   6. Demonstration and training videotape, if available.

E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
   1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
   2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
   1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.01 MANUAL PREPARATION

A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.

B. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.

C. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

D. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
   1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
   2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

E. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
   1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

F. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in Record Drawings to ensure correct illustration of completed installation.
   1. Do not use original Project Record Documents as part of operation and maintenance manuals.
   2. Comply with requirements of newly prepared Record Drawings in Division 1 Section "Project Record Documents."

G. Comply with Division 1 Section "Closeout Procedures" for the schedule for submitting operation and maintenance documentation.

END OF TEXT – SEE CHECKLIST ON FOLLOWING PAGE

OPERATION AND MAINTENANCE MANUAL
REVIEW CHECKLIST

PROJECT:		FUSS & O'NEILL JN:
DATE:		REVIEWED BY:
Equipment:		
Specification Section:		
Equipment Transmittal No.:		
	1.	Correct number of copies of Operation and Maintenance Manual Supplied
	2.	General
		a. Manual Customized
		b. Manual contains information on complete system (design, installation, operation and maintenance instructions)
		c. All material contained in manual is legible
		d. Permanent Binder and Labeled
		e. Index
	3.	Contact Information
		a. Name, address, and phone number of manufacturer
		b. Name, address, and phone number of local source of replacement parts and service
	4.	Equipment Information
		a. Equipment drawings, schematics, plates, and layouts
		b. Equipment Performance Curves
		c. Lubrication Schedule
		d. Maintenance Schedule
		e. Trouble Shooting Guide
		f. Parts List (part manufacturer, catalog number, etc.)
		g. Current Part Costs
		h. Recommended Spare Parts
		I. Special Tools Required
Remarks:		

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SECTION 01 79 00
DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.01 SUMMARY

A. Demonstration of products and systems to be commissioned and where indicated in specific specification sections.

B. Training of Owner personnel in operation and maintenance is required for:
   1. Gravity Thickener

C. Training of Owner personnel in care, cleaning, maintenance, and repair is required for:
   1. Items specified in individual product Sections.

1.02 RELATED REQUIREMENTS

A. Section 01 78 00 - Closeout Procedures

B. Section 01 78 23 – Operations and Maintenance Data

C. Other Specification Sections: Additional requirements for demonstration and training.

1.03 SUBMITTALS

A. Section 01 33 00 – Submittal Procedures, for submittal procedures; except:
   1. Make all submittals specified in this section, and elsewhere where indicated for commissioning purposes, directly to the Commissioning Authority.
   2. Submit one copy to the Commissioning Authority, not to be returned.
   3. Make commissioning submittals on time schedule specified by Commissioning Authority.
   4. Submittals indicated as "Draft" are intended for the use of the Commissioning Authority in preparation of overall Training Plan; submit in editable electronic format, Microsoft Word.

B. Draft Training Plans: Owner will designate personnel to be trained; tailor training to needs and skill-level of attendees.
   1. Submit to Commissioning Authority for review and inclusion in overall training plan.
   2. Submit not less than four weeks prior to start of training.
   3. Revise and resubmit until acceptable.
   4. Provide an overall schedule showing all training sessions.
   5. Include at least the following for each training session:
      a. Identification, date, time, and duration.
      b. Description of products and/or systems to be covered.
      c. Name of firm and person conducting training; include qualifications.
      d. Intended audience, such as job description.
      e. Objectives of training and suggested methods of ensuring adequate training.
      f. Methods to be used, such as classroom lecture, live demonstrations, hands-on, etc.
      g. Media to be used, such as slides, hand-outs, etc.
      h. Training equipment required, such as projector, projection screen, etc., to be provided by Contractor.

C. Training Manuals: Provide training manual for each attendee; allow for minimum of two attendees per training session.
   1. Include applicable portions of O&M manuals.
   2. Include copies of all hand-outs, slides, overheads, video presentations, etc., that are not included in O&M manuals.
   3. Provide one extra copy of each training manual to be included with operation and maintenance data.

D. Training Reports:
   1. Identification of each training session, date, time, and duration.
   2. Sign-in sheet showing names and job titles of attendees.

3. List of attendee questions and written answers given, including copies of and references to supporting documentation required for clarification; include answers to questions that could not be answered in original training session.
4. Include Commissioning Authority's formal acceptance of training session.

E. Video Recordings: Submit digital video recording of each demonstration and training session for Owner's subsequent use.
1. Format: DVD Disc.
2. Label each disc and container with session identification and date.

1.04 QUALITY ASSURANCE

A. Instructor Qualifications: Familiar with design, operation, maintenance and troubleshooting of the relevant products and systems.
1. Provide as instructors the most qualified trainer of those contractors and/or installers who actually supplied and installed the systems and equipment.
2. Where a single person is not familiar with all aspects, provide specialists with necessary qualifications.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.01 DEMONSTRATION - GENERAL

A. Demonstrations conducted during system start-up do not qualify as demonstrations for the purposes of this section, unless approved in advance by Owner.

B. Demonstrations conducted during Functional Testing need not be repeated unless Owner personnel training is specified.

C. Demonstration may be combined with Owner personnel training if applicable.

D. Operating Equipment and Systems: Demonstrate operation in all modes, including start-up, shut-down, seasonal changeover, emergency conditions, and troubleshooting, and maintenance procedures, including scheduled and preventive maintenance.
1. Perform demonstrations not less than two weeks prior to Substantial Completion.
2. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.

E. Non-Operating Products: Demonstrate cleaning, scheduled and preventive maintenance, and repair procedures.
1. Perform demonstrations not less than two weeks prior to Substantial Completion.

3.02 TRAINING - GENERAL

A. Commissioning Authority will prepare the Training Plan based on draft plans submitted.

B. Conduct training on-site unless otherwise indicated.

C. Owner will provide classroom and seating at no cost to Contractor.

D. Do not start training until Functional Testing is complete, unless otherwise specified or approved by the Commissioning Authority.

E. Provide training in minimum two-hour segments.

F. The Commissioning Authority is responsible for determining that the training was satisfactorily completed and will provide approval forms.

G. Training schedule will be subject to availability of Owner's personnel to be trained; re-schedule training sessions as required by Owner; once schedule has been approved by Owner failure to conduct sessions according to schedule will be cause for Owner to charge Contractor for personnel "show-up" time.

H. Review of Facility Policy on Operation and Maintenance Data: During training discuss:

1. The location of the O&M manuals and procedures for use and preservation; backup copies.
2. Typical contents and organization of all manuals, including explanatory information, system narratives, and product specific information.
3. Typical uses of the O&M manuals.

I. Product- and System-Specific Training:
1. Review the applicable O&M manuals.
2. For systems, provide an overview of system operation, design parameters and constraints, and operational strategies.
3. Review instructions for proper operation in all modes, including start-up, shut-down, seasonal changeover and emergency procedures, and for maintenance, including preventative maintenance.
4. Provide hands-on training on all operational modes possible and preventive maintenance.
5. Emphasize safe and proper operating requirements; discuss relevant health and safety issues and emergency procedures.
6. Discuss common troubleshooting problems and solutions.
7. Discuss any peculiarities of equipment installation or operation.
8. Discuss warranties and guarantees, including procedures necessary to avoid voiding coverage.
9. Review recommended tools and spare parts inventory suggestions of manufacturers.
10. Review spare parts and tools required to be furnished by Contractor.
11. Review spare parts suppliers and sources and procurement procedures.

J. Be prepared to answer questions raised by training attendees; if unable to answer during training session, provide written response within three days.

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SECTION 02 41 13
SELECTIVE SITE DEMOLITION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of contract, including General and Supplementary Conditions and Division 01 specification Sections apply to the work of this Section.

1.02 SECTION INCLUDES

A. Selective demolition of existing site elements.

B. Abandonment and removal of existing utilities and utility structures.

1.03 RELATED REQUIREMENTS

A. Section 01 57 13 - Temporary Erosion and Sediment Control.

B. Section 31 00 00 - Earthwork

C. Section 31 10 00 - Site Clearing

1.04 DEFINITIONS

A. Demolish (Demo): Dismantle a defined component of existing construction, remove it from the Site, and dispose of it either as specified or in lawful manner.

B. Dispose: Remove from the Project Site in lawful manner.

C. Reinstall: Install a removed component of existing construction into new construction as indicated.

D. Remove: Dismantle a defined component of existing construction in a manner which protects and preserves the component for future use/installation; definition includes lawful disposal, unless otherwise specifically indicated to be reinstalled, salvaged, or other described action.

E. Salvage: Remove in a manner preserving the existing condition and integrity of the component, set aside, store and protect for future reinstallation.

1.05 REFERENCE STANDARDS

A. 29 CFR 1926 - U.S. Occupational Safety and Health Standards; current edition.

B. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2013.

1.06 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.

1.07 SUBMITTALS

A. Site Plan: Showing:
   1. Vegetation to be protected, if any.
   2. Areas for temporary construction and field offices.
   3. Areas for temporary and permanent placement of removed materials.

B. Demolition Plan: Submit demolition plan as specified by OSHA and local authorities.
   1. Indicate extent of demolition, removal sequence, bracing and shoring, and location and construction of barricades and fences.
   2. Identify demolition firm and submit qualifications.

C. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.

1.08 QUALITY ASSURANCE

A. Demolition Firm Qualifications: Company specializing in the type of work required.
   1. Minimum of five years of documented experience.

PART 2 PRODUCTS

2.01 MATERIALS

A. Fill Material: As specified in Section 31 00 00 - Earthwork.

PART 3 EXECUTION

3.01 SCOPE

A. Remove paving and curbs as required to accomplish new work.

B. Within area of new construction, remove existing foundation elements completely.

C. Outside area of new construction, remove foundation walls and footings to a minimum of 2 feet below finished grade.

D. Remove concrete slabs on grade as indicated on Drawings.

E. Remove manholes and manhole covers, curb inlets and catch basins where indicated.

F. Remove fences and gates.

G. Remove creosote-treated wood utility poles.

H. Remove items as specifically indicated on Drawings.

I. Remove items specifically indicated for salvage, relocation, and recycling.

J. Fill excavations, open pits, and holes in ground areas generated as result of removals, using specified fill; compact fill as specified in Section 31 00 00.

3.02 GENERAL PROCEDURES AND PROJECT CONDITIONS

A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
   1. Obtain required permits.
   2. Comply with applicable requirements of NFPA 241.
   3. Use of explosives is not permitted.
   4. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
   5. Provide, erect, and maintain temporary barriers and security devices.
   6. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.
   7. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
   8. Do not close or obstruct roadways or sidewalks without permit.
   9. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.
   10. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon or limit access to their property.

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

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

D. Minimize production of dust due to demolition operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.

E. If hazardous materials are discovered during removal operations, stop work and notify Engineer and Owner; hazardous materials include regulated asbestos containing materials, lead, PCB's, and mercury.

F. Perform demolition in a manner that maximizes salvage and recycling of materials.
   1. Dismantle existing construction and separate materials.
   2. Set aside reusable, recyclable, and salvageable materials; store and deliver to collection point or point of reuse.

G. Partial Removal of Paving and Curbs: Neatly saw cut at right angle to surface.

3.03 EXISTING UTILITIES

3.04 SELECTIVE DEMOLITION FOR ALTERATIONS

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

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

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

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

3.05 DEBRIS AND WASTE REMOVAL

A. Remove debris and trash from site.

B. Remove from site all materials not to be reused on site; do not burn or bury.

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

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

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SECTION 03 10 00
CONCRETE FORMWORK

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. Attention is directed to the Drawings, General Conditions of the Contract and all other Division 1 Specifications which are hereby made a part of this section.

1.02 WORK TO BE PERFORMED

A. The work of this Section consists of furnishing and installing all formwork for installing cast-in-place concrete.

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Concrete Reinforcement: Section 03 21 00

B. Cast-In-Place Concrete: Section 03 30 00

1.04 SUBMITTALS

A. See Section 03 30 00 Cast-in-Place Concrete, paragraph 1.06 for submittal requirements.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Smooth-Formed Finished concrete: Form-facing panels that will provide continuous, true and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
   1. Plywood, metal or other approved panel materials.
   2. Exterior-grade plywood panels, suitable for concrete forms, complying with Voluntary Product Standard PS 1-07, Structural Plywood and as follows:
      a. High-density overlay, Class 1 or better.
      b. Medium-density overlay, Class 1 or better, mill-release agent treated and edge sealed.
      c. Chamfer Strips: Wood, metal or rubber strips, ¾ by ¾ inch.
      d. Form-Release Agent: Commercially formulated form-release agent with a maximum of 100 g/L volatile organic compounds (VOC) that will not bond with, stain, or adversely affect concrete and architectural concrete surfaces and will not impair subsequent treatments of those surfaces.
   3. Formulate form-release agent with rust inhibitor for steel form-facing materials.

B. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
   1. Form ties and spreaders in areas exposed to view shall be subject to the Owner's approval. Ties shall have a removable tapered cone. Wire ties shall not be used.
   2. Ties for walls below grade and at unexposed areas shall be snap-tied or the type specified above with removable cones and shall incorporate water seal washer.

PART 3 - EXECUTION

3.01 FORMS - GENERAL

A. Construct to shape, lines and dimensions of all concrete members.

B. Make forms substantial and sufficiently tight to prevent leakage of concrete cement paste.

C. Brace, shore and tie forms to maintain true and straight position and shape.

D. Contractor shall set and maintain concrete framework to ensure completed work within the tolerance limits listed in ACI 347 and with the following additional requirements:
   1. Variation from the plumb in lines and surfaces of knee walls 1/4" per 10 feet but not more than 1/2".
   2. Variations in cross-sectional dimensions of slabs and knee walls, plus 1/8 inch and minus 1/4 inch.

E. Forms and form accessories shall be so designed and installed in accordance with ACI 301 and be of adequate strength and upon removal will in no way damage concrete surfaces. Design of forms, shores and bracing is the responsibility of the Contractor and shall support vertical, lateral, static, dynamic and construction loads that might be applied until the structure can support such loads. Include all factors pertaining to safety of formwork structure such as live load, dead load, weight of equipment on formwork, concrete mix, height of concrete drop, vibration reactions and similar factors.

F. Provide all anchors, shores and braces required to assemble and support cast-in-place concrete and to provide specified finishes.

G. Prior to placing reinforcement, coat forms in accord with manufacturer's recommendations to provide for removal of forms without damaging surface of finished concrete. Do not coat construction joints.

H. Provide corner formers on all exposed external corners and edges exposed in final project.

I. Do not use metal cover plates for repairing defects in forms for exposed concrete work unless otherwise detailed.

J. Before form materials can be re-used in exposed areas, surfaces that will be in contact with freshly cast concrete shall be thoroughly cleaned, damaged areas repaired, and all projecting nails withdrawn. Re-use of form materials shall be subject to special approval by the Engineer.

K. Before reinforcement is placed on or against formwork, surfaces of forms coming in contact with fresh concrete shall be cleaned and then treated with the approved form release agent.

3.02 FORMS - EXPOSED FINISH

A. Place carefully and accurately. Brace to prevent sagging or misalignment.

B. Provide corner formers on all exposed concrete corners to provide 1/2-inch radius (or 3/4-inch chamfer 45 degrees).

C. Forms shall be new or in first class condition, free of holes, indentations or irregular surfaces. The Engineer’s decision on use of forms will be final. Damaged or bent forms will be rejected.

D. Exposed concrete joints shall be formed with special care to assure proper alignment and uniform cross section.

3.03 REMOVAL OF FORMS

A. Remove in manner that will not damage concrete or adversely affect appearance of exposed concrete members.

B. The temporary shoring, cribbing and formwork shall remain in place for ten (10) days after the placement of concrete and proper curing. Removal of shoring, cribbing and formwork shall also be dependent on the test results of concrete cylinders at seven (7) days and shall be subject to approval by the Engineer.

C. Exposed foundation wall surfaces shall be smooth with all imperfections, bug holes, etc. corrected and filled. Proper placement and vibration of concrete will minimize the need for corrective work.

3.04 JOINTS IN CONCRETE

A. Locate construction joints as indicated on the Contract Drawings or as approved by the Official.

B. Locate expansion and control joints as indicated on the Contract Drawings.

C. Joints shall be perpendicular to main reinforcement, unless otherwise detailed.

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SECTION 03 21 00
CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. Attention is directed to the Drawings, General Conditions of the Contract and all other Division 1 Specifications which are hereby made a part of this section.

1.02 DESCRIPTION

A. Provide concrete reinforcement as indicated and in compliance with Contract Documents:
   1. Section Includes:
      a. Reinforcement bars for frost walls and footings for new staff building, new liquid storage tank pad, new bus stop shelter pad and concrete light posts.
      b. Reinforcement bars for new cast-in-place concrete retaining walls and footings.
      c. Welded wire reinforcement for interior concrete slab-on-ground, concrete equipment pads, new ADA ramp and new Park and Ride islands.
      d. Reinforcement accessories.

1.03 REFERENCES

A. American Society for Testing and Materials International (ASTM):
   1. A775: Standard Specification for Epoxy-Coated Reinforcement Steel Bars.
   2. A884: Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement.

B. American Concrete Institute (ACI):
   1. 301: Standard Specification for Structural Concrete.
   2. 315: Details and Detailing of Concrete Reinforcement.
   3. 318: Building Code Requirements for Structural Concrete.
   4. SP-66: ACI Detailing Manual.

D. Concrete Reinforcing Steel Institute (CRSI):
   1. Manual of Standard Practice.
   2. Placing Reinforcing Bars.

E. American Welding Society (AWS):
   1. D1.4: Structural Welding Code, Reinforcement Steel.

F. Where reference is made to one of the above standards, the version in effect at the time of bid opening shall apply.

1.04 SUBMITTALS

A. Unless otherwise acceptable to the Engineer, each submittal shall include reinforcement only for the individual structure to which it pertains.

B. Shop Drawings:
   1. Submit bar lists and placing drawings for all reinforced concrete and masonry structures.
   2. Detail reinforcement in conformance with ACI SP-66.
   4. Clearly indicate bar sizes, spacings, locations and quantities of reinforcement steel and wire reinforcement, bending schedules, and supporting and spacing devices. Show joints, with applicable joint reinforcement.
   5. Coordinate bar splicing and placement with Contractor's concrete placing schedule and joint locations. Do not add or delete joints without permission from the Engineer.
   6. Show wall reinforcement in elevation.
   7. Show slab reinforcement in plan view.
   8. Show location and size of all penetrations greater than 12-inches in diameter or least dimension of the opening with the corresponding added reinforcement around the penetrations.
   9. Clearly show marking for each reinforcement item.
   10. Indicate locations of reinforcement bar cut-offs, splices and development lengths.

C. Submit certified copies of mill test reports of reinforcement analysis dated within the last three months for each shipment of reinforcement with specific lots in shipments identified.
D. Chemical composition of reinforcement steel: Ladle analysis indicating percentage of carbon, phosphorous, manganese and sulfur present in steel.
E. Where mechanical couplers are required or permitted to be used to splice reinforcement steel, submit Manufacturer's literature that contains instructions and recommendations for installation for each type of coupler used; certified test reports that verify the load capacity of each type and size of coupler used; and Shop Drawings that show the location of each coupler with details of how they are to be installed in the formwork.

1.05 QUALITY ASSURANCE

A. Do not fabricate reinforcement until shop and placement drawings have been reviewed and accepted by the Engineer.
B. Perform concrete reinforcement work in accordance with CRSI Manual of Practice, ACI 301, ACI SP-66, ACI 318/318M.
C. An independent testing agency will be retained by Owner and accepted by the Engineer to visually inspect and test reinforcing steel welds in accordance with AWS D1.4/D1.4M.

1.06 QUALIFICATIONS

A. Welders: AWS qualified within previous 12 months.

1.07 INSPECTION AND TESTING

A. In no case shall any reinforcement steel be covered with concrete until the installation of the reinforcement has been observed by the Engineer, the Certified Inspector and the Engineer’s authorization to proceed with the concreting has been obtained. The Engineer and the Certified Inspector shall be given 48 hours minimum prior notice of the readiness of placed reinforcement for observation. The forms shall be kept open until the Engineer and the Certified Inspector has finished observations of the reinforcement steel.
C. Provide the Certified Inspector with access to fabrication plants to facilitate inspection of reinforcement. Notify the CM of commencement and duration of shop fabrication, in sufficient time to allow for proper inspection.

1.08 DELIVERY, STORAGE AND HANDLING

A. Keep reinforcement steel free from mill scale, rust, dirt, grease or other foreign matter.
B. Ship and store reinforcement steel with bars of the same size and shape fastened in bundles with durable tags, marked in a legible manner with waterproof markings showing the same "mark" designations as those shown on the submitted placing drawings.
C. Store reinforcement steel off the ground, protected from moisture and kept free from dirt, oil or other injurious contaminants.
D. Provide equipment for handling epoxy coated reinforcement steel with protected contact areas. Lift bundles of coated reinforcement at multiple pick-up points to minimize bar to bar abrasion from sags in bundles. Do not drop or drag coated reinforcement steel or bundles.
E. Store coated reinforcement steel on protective cribbing.
F. Coating damage due to handling, shipment and placing need not be repaired in cases where damaged area is 0.1 sq. inch or smaller. Repair damaged areas larger than 0.1 sq. inch. Maximum amount of damage, including repaired and unrepaired areas, shall not exceed 2 percent of surface area of each bar.

PART 2 - PRODUCTS

2.01 REINFORCEMENT STEEL

A. Epoxy Coated Reinforcement Steel: Deformed bars conforming to ASTM A615, Grade 60 (420), with epoxy coating in accordance with ASTM A775.

B. Welded Wire Reinforcement:
   1. Provide welded wire reinforcement conforming to ASTM A185 in flat sheets epoxy coated in accordance with ASTM A884/A884M Class A finish.
   2. Provide deformed welded wire reinforcement to ASTM A497 in flat sheets epoxy coated in accordance with ASTM A884/A884M Class A finish.
   3. Provide support bars and reinforcement bar supports as specified herein to obtain the concrete cover indicated.
   4. Provide welded wire reinforcement heavier than W2.9 in flat sheets.

2.02 ACCESSORY MATERIALS

A. Tie Wire: Minimum 16 gage annealed type, epoxy coated.
B. Chairs, Bolsters, Bar Supports, and Spacers: sized and shaped for strength and support of reinforcement during concrete placement [including load bearing pad on bottom of base slabs and slabs on grade to prevent puncturing the vapor retarder].
D. Special Chairs, Bolsters, Bar Supports, and Spacers Adjacent to Weather Exposed Concrete Surfaces: plastic type; size and shape.
E. Use wire reinforcement supports coated with dielectric material including epoxy or other polymer for a minimum distance of 2 inches (51 mm) from the point of contact with epoxy-coated reinforcement.
F. Provide 3-inch by 3-inch plain precast concrete blocks, precast concrete doweled blocks or concrete brick for support of bottom reinforcement in foundation mats, base slabs, footings, pile caps, grade beams and slabs on grade. Provide block thickness to produce concrete cover of reinforcement as indicated.
G. Provide epoxy for grouting reinforcement bars specifically formulated for such application for the moisture condition, application temperature, and orientation of the hole to be filled. Epoxy grout shall meet the requirements in Section 03 60 00 Grout.

2.03 FABRICATION:

A. Fabricate concrete reinforcement in accordance with CRSI Manual of Standard Practice, ACI SP-66, ACI 318, ASTM A184/A184M.
B. Weld reinforcement in accordance with AWS D1.4 only when permitted by the Engineer.
C. Epoxy Coated Reinforcement: Clean surfaces, weld and re-protect welded joint in accordance with Manufacturer's instructions.
D. Locate reinforcement splices not indicated on Drawings, at point of minimum stress. Review location of splices with CM.
F. Cold bend bars. Do not straighten or re-bend bars.
H. Do not heat reinforcement steel to bend or straighten.
I. Bend bars around a revolving collar having a diameter of not less than that recommended by the ACI 318.
J. Cut bar ends that are to be butt spliced, or threaded by saw cutting. Terminate such ends in flat surfaces within 1-1/2 degrees of a right angle to the axis of the bar.
K. Apply epoxy coating to the deformed reinforcement bars under the following guidelines:
   1. Shop bend reinforcement before coating.
   2. Maintain thickness of the coating at 7 mil +/- 2 mil.
   3. Blast clean bars to near white metal before coating.
   4. Clean and coat cut ends.
   5. Patch damaged areas immediately before visible rust has formed. Patch at the fabrication plant.
   6. Provide coatings free from holes, voids, contamination, cracks and damaged areas. Check coatings visually after curing.
   7. Not more than two "holidays" (pinholes not visible to the naked eye) per 12 inch of bar are allowed in the coatings. Test coatings with a 67.5 volt holiday detector in accordance with the Manufacturer's instructions.
   8. Check each production lot and certify that all the coated bars are supplied in the fully cured condition.

9. Evaluate the flexibility of the coating by selecting bars from production lots bent 120 degrees (after rebound) around a 6 inch diameter mandrel. Make the bend at a uniform rate in not more than one minute. The longitudinal deformations may be placed in a plane perpendicular to the mandrel radius, and the test specimens shall be at a constant temperature between 70 degrees F and 85 degrees F throughout the bend test.
10. If no cracks in the coating of the bent specimen are visible to the naked eye the coating is satisfactory.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Place, support and secure reinforcement against displacement. Do not deviate from required position. Place reinforcement a minimum of 2 inches (51 mm) clear of any metal pipe or fittings.
B. Do not displace or damage vapor retarder.
C. Position dowels accurately. Rigidly support, align and securely tie dowels normal to the concrete surface before concrete placement. Setting dowels into wet concrete is prohibited.
D. Position wall dowels (if indicated) projecting from base slabs on grade with templates or guides held in place above the concrete placement line. Position the templates to obtain the required clearance between the dowels and the face of the walls.
E. Bars additional to those indicated that may be found necessary or desirable by the Contractor for the purpose of securing reinforcement in position shall be provided by the Contractor at no additional cost to the Owner.
F. Do not extend continuous reinforcement or other fixed metal items through expansion joints. Provide 2 inches (51 mm) clearance from each face of expansion joint.
G. Provide additional reinforcement bars to support top reinforcement in slabs. Do not shift reinforcement bars from positions in upper layers to positions in lower layers as a substitute for additional support bars.
H. Support reinforcement steel in accordance with CRSI “Placing Reinforcement Bars” with maximum spacing of 4 feet-0 inches.
I. Tie reinforcement steel at intersections in accordance with CRSI “Placing Reinforcement Bars”:
    1. Maximum tie spacing for footings, walls and columns: every third intersection or 3 feet-0 inches.
    2. Maximum spacing for slabs and other work: every fourth intersection or 3 feet-0 inches.
    3. Tie a minimum of 25 percent of all intersecting bars in foundation mats, base slabs, footings, slabs on grade and elevated slabs.
    4. Secure all dowels in place before placing concrete.
    5. Tie wires shall be bent away from the forms and from finished concrete surfaces in order to provide the required concrete coverage.
J. Locate reinforcement to avoid interference with items drilled in later, such as concrete anchors.
K. Extend welded wire reinforcement to within 2 inches of edges of slab or section. Lap sheets at least 12 inches or two wire spaces, whichever is greater, at ends and edges and wire tightly together. Stagger end laps.
L. Unless shown otherwise on Drawings, place welded wire reinforcement in slabs on grade between the upper third point and mid-point of slab. **Placing welded wire reinforcement on the subgrade and pulling it up during concrete placement is not permitted.**
M. Support welded wire reinforcement placed over the ground on wired concrete blocks (dobies) spaced not more than 3 feet on centers in any direction.
N. Support welded wire reinforcement placed over horizontal forms on slab bolsters spaced not more than 30 inches on center.
O. Mechanical coupler systems may be substituted for dowels at Contractor’s option when permitted by the Engineer.
P. Provide additional reinforcement bars to support ties and stirrups in beams where top reinforcement is not continuous.
Q. Securely support and tie reinforcement steel to prevent movement during concrete placement.
R. Ship, handle and place stainless steel reinforcement bars such that they do not come into direct contact with carbon steel. Use stainless steel or non-metallic tie wires and bar chairs. Use nylon, PVC, or polyethylene spacers where stainless steel bar must be attached to carbon steel, to maintain a minimum 1 inch clearance.

S. Unless otherwise shown on the Drawings or permitted by the Engineer, do not bend reinforcement bars that project from in-place concrete.

T. Do not weld reinforcement steel bars (including tack welded) either during fabrication or erection unless specifically shown on the Drawings or specified herein, or unless prior written permission has been obtained from the Engineer. Immediately remove bars that have been welded, including tack welds, without such permission from the work. Comply with AWS D1.4 when welding of reinforcement is or called for.

U. Reinforcement steel interfering with the location of other reinforcement steel, conduits or embedded items may be moved within the specified tolerances or one bar diameter, whichever is greater. Make greater displacement of bars to avoid interference only with the permission of the Engineer. Do not cut reinforcement to install inserts, conduits, mechanical openings or other items without the prior permission from the Engineer.

V. Reinforcement shall be clean and free from loose mill scale, dirt, grease, oil, form release agent, dried concrete or any material reducing bond with concrete.

W. Setting bars and welded wire reinforcement on layers of fresh concrete as the work progresses or adjusting reinforcement during the placement of concrete is prohibited.

X. Provide and place safety caps on all exposed ends of vertical reinforcement that pose a danger to injury or life safety.

3.03 CONCRETE COVER OVER REINFORCEMENT BARS

A. Conform to ACI 318 for concrete cover over reinforcement.

3.04 REINFORCEMENT AROUND OPENINGS AND PENETRATIONS

A. Accommodate placement of formed openings and penetrations.

B. Unless specific additional reinforcement around openings and penetrations is shown on the Drawings, provide additional reinforcement steel on each side of opening or penetration equivalent to one half of the cross-sectional area of the reinforcement steel interrupted by an opening or penetration. The bars shall have sufficient length to be fully developed at each end beyond the opening or penetration.

C. Refer to details on Drawings for additional diagonal bars around openings or penetrations and bar extension length on each side of openings or penetrations.

D. Where welded wire fabric is used provide extra reinforcement using fabric or deformed bars around opening or penetration.

3.05 SPLICING REINFORCEMENT

A. Splices (if required) may be used to provide continuity due to bar length limitations. Minimum length of bars spliced for this reason is 40 feet. Do not splice reinforcement that is detailed to be continuous in the Drawings.

B. Stagger bar splices.

C. Provide tension lap splices at all laps in compliance with ACI 318. Class A splices may be used when 50 percent or less of the bars are spliced within the required lap length. Use Class B splices at all other locations.

D. Except as otherwise indicated on the Drawings, stagger splices in circumferential reinforcement in circular walls using Class B tension splices. Do not splice adjacent bars within the required lap length.

E. Make splices for reinforcement in tension tie members, with a full mechanical or full welded splice and staggered at least **30 inches**.

F. Make splices in column spiral reinforcement, when necessary, by a lap of 1-1/2 turns.

G. Make reinforcement continuous through construction joints.

H. Reinforcement may be spliced at construction joints provided that entire lap is placed within only one concrete placement.

3.06 ACCESSORIES

A. Provide accessories such as chairs, chair bars and the like in sufficient quantities and strength to adequately support the reinforcement and prevent its displacement during the erection of the reinforcement and the placement of concrete.

B. Use precast concrete blocks where the reinforcement steel is to be supported over soil.

C. Provide stainless steel bar supports or steel chairs with plastic tips where the chairs are set on forms for a concrete surface that will be exposed to weather, high humidity or liquid (including bottom of slabs over liquid containing areas) unless otherwise noted on contract documents.
D. Do not use metal chairs, ferrous clips, nails, etc. that extend to the surfaces of the concrete. Do not use stones, brick or wood block supports.
E. Do not use alternate methods of supporting top steel in slabs, such as steel channels supported on the bottom steel or vertical reinforcement steel fastened to the bottom and top mats unless permitted by the Engineer.
F. Mechanical Couplers: (If required)
    1. Couplers that are located at a joint face can be a type that can be set either flush or recessed from the face as indicated.
    2. Seal couplers during concrete placement to completely eliminate concrete or cement paste from entering.
    3. Recess couplers intended for future connections a minimum of 1/2 inch from the concrete surface. After the concrete is placed, plug the coupler with plastic plugs that have an O-ring seal and the recess filled with sealant to prevent any contact with water or other corrosive materials.
    4. Unless indicated otherwise, provide mechanical coupler spacing and size to match the spacing and size of the reinforcement indicated for the adjacent section.

3.07 PLACEMENT OF EPOXY COATED REINFORCEMENT

A. Pad bundling bands and lift with strong backs or a platform bridge to prevent abrasion of bars by sagging in the bundles.
B. Do not be drop or drag bars or bundles.
C. Patch and touch up coated bars after placing. Do not place concrete until patching is reviewed by the Engineer or CM.
D. In systems for lifting, transporting and storing coated bars, pad areas in contact with the bars.

3.08 FIELD QUALITY CONTROL

A. Remove reinforcement with kinks or bends not shown on shop or placement drawings. Remove such reinforcement from job site and replace with new fabricated steel. Do not field bend of reinforcement unless reinforcement is indicated or specified to be field bent.
B. Protect reinforcement from rusting, deforming, bending, kinking and other injury. Clean in-place reinforcement that has rusted, or been splattered with concrete using sand or water blasting prior to incorporation into the work.

END OF SECTION

SECTION 03300
CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:
   1. Footings, Foundation walls, and Slabs-on-grade.
   2. Circular Clarifier and Distribution Box.

B. Related Sections:
   1. Section 02321 Earthwork for drainage fill under slabs-on-grade.

1.03 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

1.04 SUBMITTALS

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

B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
   1. Indicate amounts of mixing water to be withheld for later addition at Project site.

C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.

D. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer detailing fabrication, assembly, and support of formwork.
   1. Shoring and Reshoring: Indicate proposed schedule and sequence of stripping formwork, shoring removal, and reshoring installation and removal.

E. Welding certificates.

F. Material Certificates: For each of the following, signed by manufacturers:
   1. Cementitious materials.
   2. Admixtures.
   3. Form materials and form-release agents.
   4. Steel reinforcement and accessories.
   5. Waterstops.
   6. Curing compounds.
   7. Bonding agents.
   8. Adhesives.
   9. Semirigid joint filler.
   10. Joint-filler strips.
   11. Repair materials.

G. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:
   1. Aggregates.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
   1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

C. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
   1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
   2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.

D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.

E. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
   1. ACI 301, "Specifications for Structural Concrete," Sections 1 through 5.
   2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

F. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

G. Preinstallation Conference: Conduct conference at the Project site.
   1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
      a. Contractor's superintendent.
      b. Independent testing agency responsible for concrete design mixtures.
      c. Ready-mix concrete manufacturer.
      d. Concrete subcontractor.
   2. Review special inspection and testing and inspecting agency procedures for field quality control, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, forms and form removal limitations, shoring and reshoring procedures, anchor rod and anchorage device installation tolerances, steel reinforcement installation, floor and slab flatness and levelness measurement, concrete repair procedures, and concrete protection.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

B. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

PART 2 - PRODUCTS

2.01 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
   1. Plywood, metal, or other approved panel materials.
   2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
      a. High-density overlay, Class 1 or better.
      b. Medium-density overlay, Class 1 or better; mill-release agent treated and edge sealed.
      c. Structural 1, B-B or better; mill oiled and edge sealed.
      d. B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.

B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

C. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that will produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.

D. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.

E. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.
   1. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

F. Formulate form-release agent with rust inhibitor for steel form-facing materials.

G. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
   1. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
   2. Furnish ties that, when removed, will leave holes no larger than 1 inch in diameter in concrete surface.
   3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing or concrete that shall be liquid containing. Furnish units that will leave no corrodible metal closer than 1½” inch to the plane of exposed concrete surface.

2.02 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.

B. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, plain, fabricated from as-drawn steel wire into flat sheets.

2.03 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60, plain-steel bars, cut true to length with ends square and free of burrs.

B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.

2.04 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
   1. Portland Cement: ASTM C 150, Type I/II
      a. Fly Ash: ASTM C 618, Class F.

B. Normal-Weight Aggregates: ASTM C 33, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source.
   1. Maximum Coarse-Aggregate Size: 3/4 inch nominal.
   2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Water: ASTM C 94/C 94M and potable.

2.05 ADMIXTURES

A. Air-Entraining Admixture: ASTM C 260.

B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
   1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
   2. Retarding Admixture: ASTM C 494/C 494M, Type B.
   3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
   4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
   5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
   6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.
   7. Crystalline Waterproofing Admixture: ASTM C494

2.06 WATERSTOPS

A. Flexible PVC Waterstops: CE CRD-C 572, for embedding in concrete to prevent passage of fluids through joints. Factory fabricate corners, intersections, and directional changes.
   1. Profile: Ribbed with center bulb.
   2. Dimensions: 6 inches by 3/8 inch thick; nontapered.

B. Self-Expanding Rubber Strip Waterstops: Manufactured rectangular or trapezoidal strip, bentonite-free hydrophilic polymer modified chloroprene rubber, for adhesive bonding to concrete, 3/8 by 3/4 inch.

2.07 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

D. Water: Potable.

2.08 RELATED MATERIALS

A. Bonding Agent: ASTM C 1059/C 1059M, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

2.09 REPAIR MATERIALS

A. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch and that can be filled in over a scarified surface to match adjacent floor elevations.
   1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
   2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
   3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
   4. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C 109/C 109M.

2.010 CONCRETE MIXTURES - GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
   1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.

B. Cementitious Materials:
   1. Fly Ash: 25 percent.
   2. Combined Fly Ash and Pozzolan: 25 percent.

C. Limit water-soluble, chloride-ion content in hardened concrete to 0.10 percent by weight of cement.

D. Admixtures: Use admixtures according to manufacturer's written instructions.
   1. Use water-reducing or high-range water-reducing admixture in concrete, as required, for placement and workability.
   2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
   3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.
   4. Use corrosion-inhibiting admixture in concrete mixtures where indicated.

2.011 CONCRETE MITURES FOR BUILDING ELEMENTS

A. Gravity Thickener: Proportion normal-weight concrete mixture as follows:
   1. Minimum Compressive Strength: 4500 psi at 28 days.
   2. Maximum Water-Cementitious Materials Ratio: 0.42.
   3. Slump Limit: 8 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch.
   4. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 3/4-inch nominal maximum aggregate size.

2.012 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.013 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.
   1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.01 FORMWOK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:
   1. Class B, 1/4 inch

D. Construct forms tight enough to prevent loss of concrete mortar.

E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
   1. Install keyways, reglets, recesses, and the like, for easy removal.
   2. Do not use rust-stained steel form-facing material.

F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

H. Chamfer exterior corners and edges of permanently exposed concrete.

I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.02 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
   1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."

3.03 REMOVING AND REUSING FORMS

A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations and curing and protection operations need to be maintained.
   1. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.

2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.

B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.

C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Engineer.

3.04 SHORES AND RESHORES

A. Comply with ACI 318 and ACI 301 for design, installation, and removal of shoring and reshoring.
1. Do not remove shoring or reshoring until measurement of slab tolerances is complete.

B. In multistory construction, extend shoring or reshoring over a sufficient number of stories to distribute loads in such a manner that no floor or member will be excessively loaded or will induce tensile stress in concrete members without sufficient steel reinforcement.

C. Plan sequence of removal of shores and reshore to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.

3.05 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
1. Weld reinforcing bars according to AWS D1.4/D 1.4M, where indicated.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.06 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Engineer.
1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
5. Space vertical joints in walls as indicated.

6. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

D. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

3.07 WATERSTOPS

A. Flexible Waterstops: Install in construction joints and at other joints indicated to form a continuous diaphragm. Install in longest lengths practicable. Support and protect exposed waterstops during progress of the Work. Field fabricate joints in waterstops according to manufacturer's written instructions. Use factory prefabricated joints at corners and intersections.

B. Self-Expanding Strip Waterstops: Install in construction joints and at other locations indicated, according to manufacturer's written instructions, adhesive bonding, mechanically fastening, and firmly pressing into place. Install in longest lengths practicable.

3.08 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Engineer.

C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.
1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.

2. Maintain reinforcement in position on chairs during concrete placement.
3. Screed slab surfaces with a straightedge and strike off to correct elevations.
4. Slope surfaces uniformly to drains where required.
5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

F. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

G. Hot-Weather Placement: Comply with ACI 301 and as follows:
1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.09 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
1. Apply to concrete surfaces not exposed to public view.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
1. Apply to concrete surfaces exposed to public view, or to be covered with a coating or covering material applied directly to concrete such as waterproofing or dampproofing.

C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.010 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch in one direction.
1. Apply scratch finish to surfaces indicated and to receive concrete floor toppings.

C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.

1. Apply float finish to surfaces to receive trowel finish, and to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing.

D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
1. Apply a trowel finish to surfaces indicated and exposed to view and equipment pads.
2. Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-ft.- long straightedge resting on two high spots and placed anywhere on the surface does not exceed 3/16 inch.

E. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.
1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Engineer before application.

3.011 MISCELLANEOUS CONCRETE ITEMS

A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

B. Equipment Bases and Foundations:
1. Coordinate sizes and locations of concrete bases with actual equipment provided.
2. Construct concrete bases [4 inches] [6 inches] [8 inches] <Insert dimension> high unless otherwise indicated; and extend base not less than 6 inches in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated or unless required for seismic anchor support.
3. Minimum Compressive Strength: 4000 psi at 28 days.
4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
5. Prior to pouring concrete, place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
6. Cast anchor-bolt insert into bases. Install anchor bolts to elevations required for proper attachment to supported equipment.

3.012 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb./sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.

D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
   a. Water.
   b. Continuous water-fog spray.
   c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
   a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
   b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
   c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project.

3.013 JOINT FILLING

A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
   1. Defer joint filling until concrete has aged at least six months. Do not fill joints until construction traffic has permanently ceased.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.

3.014 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Engineer. Remove and replace concrete that cannot be repaired and patched to Engineer's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
   1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension to solid concrete. Limit cut depth to 3/4 inch. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
   2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
   3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Engineer.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
2. After concrete has cured at least 14 days, correct high areas by grinding.
3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
4. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
5. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
6. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Engineer's approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Engineer's approval.

3.015 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Inspections:
1. Steel reinforcement placement.
2. Verification of use of required design mixture.
3. Concrete placement, including conveying and depositing.
4. Curing procedures and maintenance of curing temperature.
5. Verification of concrete strength before removal of shores and forms from beams and slabs.

C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
1. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. or fraction thereof of each concrete mixture placed each day.
   a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.

3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
5. Compression Test Specimens: ASTM C 31/C 31M.
    a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
6. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
    a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
    b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
7. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
8. Test results shall be reported in writing to Engineer, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
9. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Engineer but will not be used as sole basis for approval or rejection of concrete.
10. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Engineer. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Engineer.
11. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
12. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

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SECTION 03 62 00
NON-SHRINK GROUT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section includes:
   1. Cementitious Grout.
   2. Epoxy Grout.

1.03 DEFINITIONS

B. For the purpose of these Specifications, “non-shrink grout” shall be defined as a high-strength mortar or grout which does not shrink in the plastic state, is dimensionally stable in the hardened state, and bonds permanently to clean metal surfaces and concrete substrate.

1.04 SUBMITTALS

C. Product Data: Submit manufacturer’s product data and installation instructions.

D. Certification: Submit certificates of compliance or laboratory test reports which indicate the following:
   1. Materials used in the grout are free from metallic components and corrosion-producing elements.
   2. Materials meet specified shrinkage and compressive strength requirements.

1.05 QUALITY ASSURANCE

A. Inspections and Tests: Perform visual inspections and shrinkage tests using an appropriate independent testing laboratory, and strength tests as necessary to verify performance requirements of grout. Sampling and testing of grout shall conform with applicable ASTM or CRD-C620 requirements. The independent testing laboratory shall perform sampling, testing, and inspection in accordance with the provisions herein. The Contractor shall cooperate with and notify District at least 48 hours in advance of sampling, tests, and inspections being performed by the independent testing laboratory. District may elect to observe these procedures.

B. Visual Inspections: Perform visual inspection of the grout mixing and placement to determine and verify that grout consistency, slump, and stiffness are appropriate and proper for the location and type of installation.

C. Shrinkage Tests:
   1. Cementitious Grout: Grout shall meet the following performance requirements:
      a. Expansion: 0.4 percent maximum at three, 14, and 28 Days. Grout shall exhibit no displacement when tested in accordance with ASTM C157/C157M.
      b. Shrinkage: None (0.00 shrinkage at 28 Days when tested in accordance with ASTM C827/C827M and ASTM C1090/1090M). There shall be no vertical volume shrinkage of grout in the plastic or hardened stage at any time.

D. Strength Tests: Compressive strength of grout shall meet the following requirements:
   1. Cementitious Grout: 5,000 psi minimum at 28 Days when tested in accordance with ASTM C109/C109M.
   2. Epoxy Grout: 10,000 psi minimum at seven Days when tested in accordance with ASTM C579.

2 PRODUCTS

2.01 MATERIALS

A. Cementitious Grout: Provide non-shrink, non-metallic, non-corrosive cement-based grout conforming to the following requirements:
   1. Applicable Standards: ASTM C1107/C1107M and CRD-C621.
   2. Grout shall be manufactured specifically for use in supporting heavy loads (loads in excess of 300 pounds per square foot concentrated load or 100 pounds per square foot uniform load). Grout: ASTM C1107/C1107M, Grade A, B, or C, as appropriate for the condition or circumstance.
   3. Shrinkage at 28 Days: No shrinkage before hardening (0.00 shrinkage when tested in accordance with ASTM C827/C827M); no shrinkage after hardening (0.00 shrinkage when tested in accordance with CRD-C621).
   4. Compressive strength, minimum as specified in ASTM C1107/C1107M, Table 1:
      a. At One Day: 1000 psi
      b. At Three Days: 2500 psi
      c. At Seven Days: 3500 psi
      d. At 28 Days: 5000 psi
   5. Initial setting time, after addition of water: approximately one hour at 70 degrees Fahrenheit.
   6. Provide nonsag trowelability or flowability as necessary for the particular application.

B. Water: Clean and potable, free of impurities detrimental to grout.

C. Epoxy Adhesive: ASTM C881/C881M, Type V, epoxy-based bonding agent.

2.02 MIXING

A. Mix grout ingredients for both cementitious grout and epoxy grout in accordance with the respective manufacturer's mixing instructions and recommendations. Mix grout materials in proper mechanical mixers.

B. Mix grout as close to work area as possible.

3 EXECUTION

3.01 SURFACE PREPARATION

A. Concrete surfaces to receive grout shall be prepared by chipping, sandblasting, water blasting, or other accepted methods to remove defective concrete, laitance, dirt, oil, grease, and other foreign matter to achieve sound, clean concrete surfaces. Lightly roughen concrete for bond, but not enough to interfere with proper placement of grout.

B. Cover concrete areas with protective waterproof covering until ready to place grout.

C. Remove foreign matter from steel surfaces to be in contact with grout. Clean contact steel surfaces as necessary by wire brushing and wiping dust clean.

D. Align and level components to be grouted and maintain in final position until grout placement is complete and accepted.

E. Install forms for grout around the column base plates and other spaces to be grouted. The tops of such forms shall be one inch above the surfaces to be grouted.

F. Remove protective waterproof covering and clean contaminated surfaces immediately before grouting.

G. Provide air-relief holes in large baseplates and in baseplates where underneath obstructions may cause air entrapment.

H. Saturate concrete surfaces with clean water and remove excess water immediately before grouting.

I. Where necessary or appropriate for better bond, epoxy adhesive may be applied to clean, dry substrate surfaces in accordance with applicable requirements of ACI 503.2.

3.02 PLACING GROUT

A. Place grout in accordance with the respective manufacturer's installation instructions and recommendations. Pour grout from one side only until grout rises at least one inch above the plate on opposite side of said plate. Strapping and plunging or other recommended method may be used to force grout to flow under the entire area.

B. Neatly trowel edges of grout base, tapered at an angle of 60 degrees when measured from the horizontal, or as indicated. Provide dry-pack cementitious grout where additional grout is required for shoulders.

C. Do not remove leveling shims for at least 48 hours after grout has been placed.

D. After shims have been removed, if used, fill voids with grout, packing the material with a suitable tool.

E. Do not use grout which has begun to set or if more than one hour has elapsed after initial mixing.

3.03 CURING

A. Cementitious grout shall be cured the same as specified for concrete in Section 03 35 00, Concrete Finishing.

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SECTION 05 50 00
METAL FABRICATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section Includes:
   1. Steel framing and supports for applications where framing and supports are not specified in other Sections.
   2. Structural-steel door frames.

B. Products furnished, but not installed, under this Section include the following:
   1. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.

C. Related Requirements:
   1. Section 033000 "Cast-in-Place Concrete" for installing anchor bolts, steel pipe sleeves, slotted-channel inserts, wedge-type inserts, and other items cast into concrete.
   2. Section 051200 "Structural Steel Framing."

1.03 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of metal fabrications that are anchored to or that receive other work. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.04 SUBMITTALS

A. Product Data: For the following:
   1. Paint products.
   2. Grout.

B. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide Shop Drawings for the following:
   1. Steel framing and supports for applications where framing and supports are not specified in other Sections.
   2. Structural-steel door frames.

C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

D. Research/Evaluation Reports: For post-installed anchors, from ICC-ES.

1.05 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Welding Qualifications: Qualify procedures and personnel according to the following:
   1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.06 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

PART 2 - PRODUCTS

2.01 METALS

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

B. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

C. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.

D. Steel Tubing: ASTM A 500/A 500M, cold-formed steel tubing.

2.02 FASTENERS

A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
   1. Provide stainless-steel fasteners for fastening aluminum.
   2. Provide stainless-steel fasteners for fastening stainless steel.

B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.

C. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, ASTM F 593; with hex nuts, ASTM F 594; and, where indicated, flat washers; Alloy Group 1.

D. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563; and, where indicated, flat washers.
   1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.

E. Anchors, General: Anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488/E 488M, conducted by a qualified independent testing agency.

F. Cast-in-Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.

G. Post-Installed Anchors: Chemical anchors.
   1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.
   2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.

2.03 MISCELLANEOUS MATERIALS

A. Low-Emitting Materials: Paints and coatings shall comply with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

B. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
   1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.

C. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.

D. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.

F. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

G. Concrete: Comply with requirements in Section 033000 "Cast-in-Place Concrete" for normal-weight, air-entrained, concrete with a minimum 28-day compressive strength of 3000 psi.

2.04 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

D. Form exposed work with accurate angles and surfaces and straight edges.

E. Weld corners and seams continuously to comply with the following:
   1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
   2. Obtain fusion without undercut or overlap.
   3. Remove welding flux immediately.
   4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing.

F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.

G. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

J. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches, with a minimum 6-inch embedment and 2-inch hook, not less than 8 inches from ends and corners of units and 24 inches o.c., unless otherwise indicated.

2.05 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.

B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.
   1. Fabricate units from slotted channel framing where indicated.
   2. Furnish inserts for units installed after concrete is placed.

C. Galvanize exterior miscellaneous framing and supports.

2.06 STRUCTURAL-STEEL DOOR FRAMES

A. Fabricate structural-steel door frames from steel shapes, plates, and bars of size and to dimensions indicated, fully welded together, with 5/8-by-1-1/2-inch steel channel stops, unless otherwise indicated. Plug-weld built-up members and continuously weld exposed joints. Secure removable stops to frame with countersunk machine screws, uniformly spaced at not

more than 10 inches o.c. Reinforce frames and drill and tap as necessary to accept finish hardware.

1. Provide with integrally welded steel strap anchors for securing door frames into adjoining concrete or masonry.

B. Extend bottom of frames to floor elevation indicated with steel angle clips welded to frames for anchoring frame to floor with expansion shields and bolts.

C. Galvanize [and prime] [exterior] steel frames.

D. Prime [exterior] steel frames with [zinc-rich primer.] [primer specified in Section 099600 "High-Performance Coatings."]

2.07 MISCELLANEOUS STEEL TRIM

A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.

B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.

1. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.

C. Galvanize exterior miscellaneous steel trim.

2.08 FINISHES - GENERAL

A. Finish metal fabrications after assembly.

B. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.09 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.

1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.

B. Preparation for Shop Priming Galvanized Items: After galvanizing, thoroughly clean railings of grease, dirt, oil, flux, and other foreign matter, and treat with metallic phosphate process.

C. Shop prime iron and steel items [not indicated to be galvanized] unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.

1. Shop prime with [universal shop primer] [primers specified in Section 099113 "Exterior Painting"] [primers specified in Section 099123 "Interior Painting"] unless [zinc-rich primer is] [primers specified in Section 099600 "High-Performance Coatings" are] indicated.

D. Preparation for Shop Priming: Prepare surfaces to comply with [SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."] [SSPC-SP 3, "Power Tool Cleaning."] [requirements indicated below:]

1. Exterior Items: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
2. Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
3. Items Indicated to Receive Primers Specified in Section 099600 "High-Performance Coatings": SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
4. Other Items: SSPC-SP 3, "Power Tool Cleaning."

E. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

C. Field Welding: Comply with the following requirements:
   1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
   2. Obtain fusion without undercut or overlap.
   3. Remove welding flux immediately.
   4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.

E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

F. Corrosion Protection: Coat concealed surfaces of aluminum that come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:
   1. Cast Aluminum: Heavy coat of bituminous paint.
   2. Extruded Aluminum: Two coats of clear lacquer.

3.02 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

B. Anchor supports for [ceiling hung toilet partitions] [operable partitions] [overhead doors] [and] [overhead grilles] securely to, and rigidly brace from, building structure.

C. Support steel girders on solid grouted masonry, concrete, or steel pipe columns. Secure girders with anchor bolts embedded in grouted masonry or concrete or with bolts through top plates of pipe columns.
   1. Where grout space under bearing plates is indicated for girders supported on concrete or masonry, install as specified in "Installing Bearing and Leveling Plates" Article.

D. Install pipe columns on concrete footings with grouted baseplates. Position and grout column baseplates as specified in "Installing Bearing and Leveling Plates" Article.
   1. Grout baseplates of columns supporting steel girders after girders are installed and leveled.

3.03 INSTALLING PREFABRICATED BUILDING COLUMNS

A. Install prefabricated building columns to comply with AISC 360, "Specifications for Structural Steel Buildings," and with requirements applicable to listing and labeling for fire-resistance rating indicated.

3.04 INSTALLING METAL BOLLARDS

A. Fill metal-capped bollards solidly with concrete and allow concrete to cure seven days before installing.
   1. Do not fill removable bollards with concrete.

B. Anchor bollards to existing construction with [expansion anchors] [anchor bolts] [through bolts]. Provide four 3/4-inch bolts at each bollard unless otherwise indicated.
   1. Embed anchor bolts at least 4 inches in concrete.

C. Anchor bollards in concrete [with pipe sleeves preset and anchored into concrete] [in formed or core-drilled holes not less than 8 inches deep and 3/4 inch larger than OD of bollard]. Fill annular space around bollard solidly with nonshrink grout; mixed and placed to comply with grout manufacturer's written instructions. Slope grout up approximately 1/8 inch toward bollard.

D. Anchor bollards in place with concrete footings. Center and align bollards in holes 3 inches above bottom of excavation. Place concrete and vibrate or tamp for consolidation. Support and brace bollards in position until concrete has cured.

E. Anchor internal sleeves for removable bollards in [concrete by inserting in pipe sleeves preset into concrete] [formed or core-drilled holes not less than 8 inches deep and 3/4 inch larger than OD of sleeve]. Fill annular space around internal sleeves solidly with nonshrink grout; mixed and placed to comply with grout manufacturer's written instructions. Slope grout up approximately 1/8 inch toward internal sleeve.

F. Anchor internal sleeves for removable bollards in place with concrete footings. Center and align sleeves in holes 3 inches above bottom of excavation. Place concrete and vibrate or tamp for consolidation. Support and brace sleeves in position until concrete has cured.

G. Place removable bollards over internal sleeves and secure with 3/4-inch machine bolts and nuts. After tightening nuts, drill holes in bolts for inserting padlocks. Owner furnishes padlocks.

H. Fill bollards solidly with concrete, mounding top surface to shed water.
   1. Do not fill removable bollards with concrete.

3.05 INSTALLING WIRE ROPE PARKING GARAGE GUARDS

A. Install wire rope parking garage guards at locations indicated, mounted at 18 and 27 inches above the parking surface. Secure wire ropes to parking garage columns and walls and tighten to remove slack.

3.06 INSTALLING PIPE GUARDS

A. Provide pipe guards at exposed vertical pipes in parking garage where not protected by curbs or other barriers. Install by bolting to wall or column with expansion anchors. Provide four 3/4-inch bolts at each pipe guard. Mount pipe guards with top edge 26 inches above driving surface.

3.07 INSTALLING NOSINGS, TREADS, AND THRESHOLDS

A. Center nosings on tread widths unless otherwise indicated.

B. For nosings embedded in concrete steps or curbs, align nosings flush with riser faces and level with tread surfaces.

C. Seal thresholds exposed to exterior with elastomeric sealant complying with Section 079200 "Joint Sealants" to provide a watertight installation.

3.08 INSTALLING CAST-IRON WHEEL GUARDS

A. Anchor wheel guards to concrete or masonry construction to comply with manufacturer's written instructions. Fill cores solidly with concrete.

3.09 INSTALLING BEARING AND LEVELING PLATES

A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.

B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with nonshrink grout. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.010 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
   1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in [Section 099113 "Exterior Painting."] [Section 099123 "Interior Painting."]

C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780/A 780M.

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SECTION 05 52 13
PIPE AND TUBE RAILING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section Includes:
   1. Aluminum pipe railings.

1.03 UNIT PRICES

A. General: Pipe and tube railings installed under Bid Alternate No. 2 will be paid for by the linear foot.

B. Installation of railing under Bid Alternate No. 2 shall include the removal and disposal of existing railings; patching of the remaining post holes with grout; and the materials, labor and equipment required to install new pipe railings as designated in the plans.

1.04 COORDINATION

A. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

B. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not satisfy structural performance requirements.

1.05 SUBMITTALS

A. Product Data: For the following:
   1. Manufacturer's product lines of mechanically connected railings.
   2. Railing brackets.
   3. Grout, anchoring cement, and paint products.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

C. Samples: For each type of exposed finish required.
   1. Sections of each distinctly different linear railing member, including handrails, top rails, posts, and balusters.
   2. Fittings and brackets.
   3. Assembled Sample of railing system, made from full-size components, including top rail, post, handrail, and infill. Sample need not be full height.
      a. Show method of connecting members at intersections.

D. Delegated-Design Submittal: For railings, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

E. Qualification Data: For testing agency.

F. Welding certificates.

G. Product Test Reports: For pipe and tube railings, for tests performed by a qualified testing agency, according to ASTM E 894 and ASTM E 935.

H. Evaluation Reports: For post-installed anchors, from ICC-ES.

1.06 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to the following:
   1. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."

1.07 DELIVERY, STORAGE, AND HANDLING

A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design railings, including attachment to concrete construction.

B. Structural Performance: Railings, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
   1. Handrails and Top Rails of Guards:
      a. Uniform load of 50 lbf/ ft. applied in any direction.
      b. Concentrated load of 200 lbf applied in any direction.
      c. Uniform and concentrated loads need not be assumed to act concurrently.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
   1. Temperature Change: 120 deg F.

2.02 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.

2.03 ALUMINUM

A. Aluminum, General: Provide alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and durability properties of alloy and temper designated below for each aluminum form required.

B. Extruded Bars and Tubing: ASTM B 221 (ASTM B 221M), Alloy 6063-T5/T52.

C. Extruded Structural Pipe and Round Tubing: ASTM B 429/B 429M, Alloy 6063-T6.
   1. Provide Standard Weight (Schedule 40) pipe unless otherwise indicated.

D. Drawn Seamless Tubing: ASTM B 210 (ASTM B 210M), Alloy 6063-T832.

E. Plate and Sheet: ASTM B 209 (ASTM B 209M), Alloy 6061-T6.

F. Die and Hand Forgings: ASTM B 247 (ASTM B 247M), Alloy 6061-T6.

G. Castings: ASTM B 26/B 26M, Alloy A356.0-T6.

2.04 FASTENERS

A. General: Provide the following:
   1. Aluminum Railings: Type 304 stainless-steel fasteners.
   2. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.

B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.

C. Fasteners for Interconnecting Railing Components:
   1. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless exposed fasteners are unavoidable or are the standard fastening method for railings indicated.

D. Post-Installed Anchors: chemical anchors capable of sustaining, without failure, a load equal to 6 times the load imposed when installed in unit masonry and 4 times the load imposed when

installed in concrete, as determined by testing according to ASTM E 488/E 488M, conducted by a qualified independent testing agency.

1. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 (A1) stainless-steel bolts, ASTM F 593 (ASTM F 738M), and nuts, ASTM F 594 (ASTM F 836M).

2.05 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
   1. For aluminum railings, provide type and alloy as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.

B. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.

C. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.06 FABRICATION

A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.

B. Shop assemble railings to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.

C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

D. Form work true to line and level with accurate angles and surfaces.

E. Fabricate connections that are exposed to weather in a manner that excludes water. Provide weep holes where water may accumulate.

F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.

G. Connections: Fabricate railings with either welded or nonwelded connections unless otherwise indicated.

H. Welded Connections for Aluminum Pipe: Fabricate railings to interconnect members with concealed internal welds that eliminate surface grinding, using manufacturer's standard system of sleeve and socket fittings.

I. Nonwelded Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.

J. Form Changes in Direction as Follows:
   1. By flush bends or by inserting prefabricated flush-elbow fittings.

K. For changes in direction made by bending, use jigs to produce uniform curvature for each repetitive configuration required. Maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

L. Close exposed ends of railing members with prefabricated end fittings.

M. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.

2.07 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, AA-M12C22A41.

PART 3 - EXECUTION

3.01 INSTALLATION - GENERAL

A. Fit exposed connections together to form tight, hairline joints.

B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.
   1. Do not weld, cut, or abrade surfaces of railing components that are coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
   2. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
   3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.

C. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.
   1. Coat, with a heavy coat of bituminous paint, concealed surfaces of aluminum that are in contact with grout, concrete, masonry, wood, or dissimilar metals.

D. Adjust railings before anchoring to ensure matching alignment at abutting joints.

E. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.02 RAILING CONNECTIONS

A. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.

B. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve extending 2 inches beyond joint on either side, fasten internal sleeve securely to one side, and locate joint within 6 inches of post.

3.03 ADJUSTING AND CLEANING

A. Clean aluminum by washing thoroughly with clean water and soap and rinsing with clean water.

3.04 PROTECTION

A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.

END OF SECTION

SECTION 09 96 00
HIGH PERFORMANCE COATINGS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes non-architectural painting as indicated on Contract Drawings and specified herein.

B. Do not paint the following
   1. Copper, bronze, chromium plate, stainless steel, aluminum and monel metal.
   2. Glass and plastic.

1.03 RELATED WORK

A. Section 09 90 00 – Architectural Painting.

B. Factory Prefinished Items as Specified.

1.04 REFERENCES

A. Steel Structures Painting Council (SSPC) Specifications:
   1. SSPC-PA 1-82: Shop, Field, and Maintenance Painting.
   2. SSPC-SP 1-82: Solvent Cleaning.
   3. SSPC-SP 3-82: Power Tool Cleaning.
   4. SSPC-SP 6-85: Commercial Blast Clearing.
   5. SSPC-SP10-82: Near-White Blast Cleaning.
   6. SSPC-PA1-64, No. 1 Shop, Field and Maintenance Painting
   7. SSPC-PA 2-73T, Measurement of Dry Paint Thickness with Magnetic Gauges.
   8. SSPC Description of blast cleaning samples (also ASTM D2200-67).

B. NACE: National Association of Corrosion Engineers.

C. American National Standards Institute (ANSI):
   1. A13.1: Scheme for the Identification of Piping Systems, Designation.

1.05 SUBMITTALS

A. See Section 01 33 00.

B. Submit for review color samples, from manufacturer, for preparation of color schedule.

C. Submit list of coating products (Paint Schedule) with brand, type and manufacturer including dry film thickness and volatile organic compound (V.O.C.) limits conforming to these specifications.

D. Submit manufacturer's current printed recommendations and product data sheets for each including performance criteria, surface preparation and applications, instructions and safety requirements, including cleaning recommendations for existing concrete surfaces.

E. For Shop Painting, submit the following:

https://us-partner-integrations.egnyte.com/msoffice/wopi/files/39fcdb0d-48ed-4b7a-9551-4296027a679b/WOPIServiceId_TP_EGNYTE_PLUS/WOPIUserId_6097.trilon.egnyte.com/09 96 00 - FL - HIGH PERFORMANCE COATINGS.docx

1. List of coating products proposed, by type, brand and manufacturer.
2. Paint manufacturer's current printed recommendations and product data sheets for each product used.
3. Shop painting applicator's correspondence for determining compatibility of shop coatings with field coats and for selecting manufacturer producing field coats.

F. Shop Applicator's Certificate
1. Submit certificate from firm applying paint, that the following was accomplished:
   a. Immediately before painting, surfaces were cleaned as specified, in suitable condition, dry, free from dust, rust and mill scale when coated.
   b. Surface preparation, coating use, mixing, application and curing were in accordance with current printed recommendations of the paint manufacturer.
   c. Products specified were used. List names of products and manufacturers.
   d. Products used within shelf dates. List dates.
   e. Paint manufacturers invoices covering products used in this job. Submit copies of invoices.
   f. Specified dry film thicknesses have been attained.
   g. State quantities of each product used for different coats on various surfaces.
2. Shop painting submittal to include the following:
   a. List of coating products to be used.
   b. Paint manufacturer's current printed recommendations and product data sheets for each product used.
   c. Shop painting applicator's correspondence for determining compatibility of shop coatings with field coats and for determining name of manufacturer producing field coats.
3. Submittal within 10 days after shop painting completed should include:
   a. Applicator's certificate.
   b. Paint manufacturer representative's certificate.

G. Submittals for substitution proposals.
1. With substitution proposals, submit notarized certificates on letterhead of manufacturer, certifying:
   a. That proposed substitute is equivalent of specified material in qualities specified.
   b. That list of compared qualities attached is accurate.
   c. That proposed substitution is suitable for intended use.
2. Submit paint manufacturer's current printed information, recommendations and product data sheets for both proposed substitutions and specified products, and compare proposed substitution and specified products for specified qualities.

1.06 PAINT STORAGE AND MIXING AREAS AND WASTE DISPOSAL

A. Store paints and painter's materials only in area or areas designated solely for this purpose. Confine mixing, thinning, clean-up and associated operations, and storage of painting debris before authorized disposal to these areas.

B. Do not use plumbing fixtures, piping or mechanical equipment for mixing or disposal of paint materials.

1. Transport water to paint area by approved temporary hose or piping.
2. Store waste temporarily in closed, nonflammable containers until final disposal. Keep no rubbish in painter's area longer than 24 hours. Finally, dispose of waste in an approved disposal system outside of buildings.

1.07 DELIVERY, HANDLING, STORAGE, PROTECTION

A. Deliver materials to site and painter’s area in manufacturer's sealed containers. Each container shall be labeled by manufacturer, listing brand name, type of paint, shelf life date, components, color, and instructions for reducing. Do not use or retain contaminated, outdated, prematurely opened or diluted materials.

B. Store materials in a heated storage room designated for storage of paint material only. Such storage place shall be kept neat and clean, and any damage to storage area or surroundings shall be made good. Remove soiled and used rags, waste and trash each night. Take Every precaution shall be taken to avoid danger of fire.

C. Store coated items carefully. Avoid damaging or dirtying coatings, by contact with soil, pavement or other harmful contacts which might necessitate special cleaning. Use suitable blocking during storage.

D. Do not expose primed surfaces to weather for more than 6 months before top coating. Allow less open time if recommended by coating manufacturer.

E. During surface preparation, cleaning and painting operations, protect all surfaces not to be painted.

F. Protect coated items, whether prime or finish, from damage due to shipping and handling. Use padding, blocking, fabric slings and extra care.

G. Upon completion of field painting, ensure coatings are undamaged and in good condition. Correct damage or coating deterioration resulting from failure to observe foregoing requirements.

H. At time of delivery of shop painted items to job site, ensure coatings are undamaged and in good condition.

1.08 PRODUCT CONDITIONS

A. Environmental Requirements
   1. Comply with manufacturer's recommendations as to environmental conditions under which coatings and coating systems can be applied.
   2. Do not apply coatings when dust is being generated.

B. Protection
   1. Cover or otherwise protect finish work of other trades and surfaces not being painted concurrently or not to be painted.

PART 2 - PRODUCTS

2.01 MATERIALS - GENERAL

A. Paint Coatings - Suitable for intended use, recommended by their manufacturer for intended service. Use coatings on ferrous surfaces of protective paint coating quality.

B. Products Used - Minimum of 5 years satisfactory use under similar service conditions. Evaluate coating performance based on performance criteria.

C. Use products of one manufacturer in any one paint coating system; all coating materials compatible. Coatings for touch-up: same as original.

D. Use shop coats not requiring special intercoat preparation to produce good topcoat bond. Do not use glossy acrylic shop coats on surfaces to be field painted.

E. Materials listed in the schedule below are products which have been selected to indicate the quality and type required. Use the products of only one manufacturer

2.02 COLORS AND FINISHES

A. Interior Colors - Final colors to be selected by the Architect.

B. To provide contrast between successive coats, lightly tint each coat to distinguish it from preceding coats.

C. Unless otherwise indicated for finish paint, use gloss or semigloss on metal, and matte finish or flat on masonry, concrete and GWB.

2.03 COATING SCHEDULE

A. Basis-of-Design Product: The specified paint systems are based on products manufactured by Tnemec, Inc.. Subject to compliance with requirements, provide the named product or a comparable product by one of the following:
   1. Sherwin Williams
   2. Benjamin Moore

B. Interior Surfaces
   1. Ferrous Metal Surfaces
      a. Shop Applied Primer
         1) Surface Preparation: SSPC-SP-6
         2) Prime: Sherwin Williams B58W00610 Macropoxy 646, FC Tnemec N69-1211, Carboline Carboguard 890 or equal, Red Primer at 2.5 mils DFT.
         3) Field touch-up: Sherwin Williams B58W00610 Macropoxy 646, FC Tnemec N69-1211, Carboline Carboguard 890 or equal, Red Primer.
      b. Field Painting
         1) Pressure wash previously shop primed steel; remove dirt and other contamination.
         2) Field Prime/Intermediate Coat: Sherwin Williams B58W00610 Macropoxy 646, FC Tnemec Series N69 Hi Build Epoxoline, Carboline Carboguard 890 or equal at 3 to 5 mils DFT.
         3) Field Finish Coat: Sherwin Williams B58W00610 Macropoxy 646, FC Tnemec Series N69 Hi Build Epoxoline, Carboline Carboguard 890 or equal at 3 to 5 mils DFT.
   2. Galvanized and Non-Ferrous Metals Scheduled to be Painted:
      a. Surface Preparation: Lightly blast clean to achieve a surface profile (anchor pattern) between 1.0 to 2.0 mils. Solvent clean surfaces with the solvent, which is compatible

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with the Tnemec Series N69, Carboline Carboguard 890, Sherwin Williams Macropoxy 646 FC or equal.

b. Prime Coat: Sherwin Williams B58W00610 Macropoxy 646, FC Tnemec Series N69 Hi Build Epoxoline, Carboline Carboguard 890 or equal.
c. Finish Coat: Tnemec Series Sherwin Williams B58W00610 Macropoxy 646, FC Tnemec Series N69 Hi Build Epoxoline, Carboline Carboguard 890 or equal.

3. Plastic Piping (Scheduled to be Painted)
   a. Surface Preparation: Lightly sand all plastic surfaces and dry wipe prior to finish painting.
   b. Prime Coat: Sherwin Williams B66A01320 PI Pro-Cryl Universal Industrial Primer, Tnemec 27 Typoxy, Carboline Carbocrylic 120 or equal.
   c. Finish Coat: Sherwin Williams B58W00610 Macropoxy 646, Tnemec N69 Hi Build Epoxoline, Carboline Carboguard 890 or equal.
4. Pumps, Motors, Housings and Misc. Metal - Shop Primed
   a. Shop Prime: In accordance with appropriate metal surface system specified above.
   b. Surface Preparation: SSPC-SP-1 Solvent Clean prior to painting.
   c. Touch-up: Sherwin Williams B58W00610 Macropoxy 646, Tnemec N69-1211, Carboline Carboguard 890 or equal, Red Primer.
   d. Prime: Sherwin Williams B58W00610 Macropoxy 646, Tnemec N69 Hi Build Epoxoline, Carboline Carboguard 890 or equal at 3 to 4 mils DFT.
   e. Finish: Sherwin Williams B58W00610 Macropoxy 646, Tnemec N69 Hi Build Epoxoline, Carboline Carboguard 890 or equal at 3 to 4 mils DFT.
5. Interior Ductile Iron Piping
   a. Shop Prime: B58W00610 Macropoxy 646 by Sherman Williams or approved equal.
   b. Field Touch-up: Sherwin Williams B58W00610 Macropoxy 646, Tnemec Series 1, Carboline Carboguard 890 or equal.
   c. 1st Field Coat: Sherwin Williams B58W00610 Macropoxy 646, Tnemec N69 Hi Build Epoxoline, Carboline Carboguard 890 or equal at 3 to 4 mils DFT.
   d. 2nd Field Coat: Sherwin Williams B58W00610 Macropoxy 646, Tnemec N69 Hi Build Epoxoline, Carboline Carboguard 890 or equal at 3 to 4 mils DFT.
6. Insulated Pipe Covering
   a. Prime: Sherwin Williams B66A01320 Pro Industrial Primer Pro-Cryl Universal Acrylic, Tnemec 151 Sealer, Carboline Carbocrylic 120 or equal.
   b. Finish: Sherwin Williams B66T00304 Sher-Cryl HPA, Tnemec Series 6 Tneme-Cryl, Carboline Sanitile 155 or equal.
7. Interior CMU
   a. Prime: Sherwin Williams B42W00150 Heavy Duty Block Filler, Tnemec Series 130 Filler
   b. Finish: Apply TWO coats of Sherwin Williams B58W00610 Macropoxy 646, FC Tnemec Series N69 Epoxoline @ 4.0-5.0 mils per coat or Equal.
8. Interior Dry Wall
   a. Prime: Sherwin Williams B51W00623 PrepRite ProBlock Interior/Exterior Latex Primer/Sealer Deep Base, or approved equal.

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b. Finish: Apply two coats of Sherwin Williams B24W02653 ProMar 200 Zero VOC Interior Latex Low Sheen Deep Base, Tnemec N69-1211, Carboline Carboguard 890 or equal, Red Primer.

9. Interior & Exterior Hollow Metal Doors and Frames
   a. Sand factory primer and touch-up as required, then apply one coat of Sherwin Williams B58W00610 Macropoxy 646 FC Tnemec Series 27 Typoxy (color) @ 3.0-4.0 mils dry.
   b. Finish: Apply one coat of Sherwin Williams B65WJ0311 Hi-Solids Polyurethane 250 Gloss or Tnemec Series 73 Endura Shield (color) @ 2.5-5.0 mils dry, or approved equal.

C. Exterior Surfaces
   1. Ferrous Metal Immersion Service
      a. Surface Preparation: SSPC-SP-10
      b. Shop Coat: Sherwin Williams Sher-Plate 600, Tnemec Series 1 Primer, Carboline Carboguard 561 or equal 1 at 3 to 5 mils DFT.
      c. Field Preparation: Lightly scarify the surface prior to field painting.
      d. Field Prime/Intermediate Coat: Sherwin Williams B58R00681 Sher-Plate 600, Tnemec Series N69 Hi Build, Carboline Carboguard 890 or equal at 3 to 5 mils DFT.
      e. Finish Coat: Sherwin Williams B58R00681 Sher-Plate 600, Tnemec Series N69 Hi Build, Carboline Carboguard 890, Sherwin Williams Sher-Plate 600 or equal at 3 to 5 mils DFT.
   2. Ferrous Metals Subject to Splash (Bridge Steel over Clarifiers, Railings, Etc.)
      a. Surface Preparation: SSPC-SP-10
      b. Shop Coat: Sherwin Williams Macropoxy 4600, Tnemec Series 90-97 Zinc, Carboline Carbozinc 621 or equal a 2.5 to 3.5 mils DFT.
      c. Field Preparation: Pressure wash, touch up with Sherwin Williams Macropoxy 4600, Tnemec Series 90G1K97, Carboline Carbozinc 621 or equal.
      d. Prime Coat: Sherwin Williams B58A00730 Macropoxy 4600, Tnemec Series N69 Hi Build Epoxoline, Carboline Carboguard 888 or equal at 3 to 5 mils DFT.
      e. Intermediate Coat: Sherwin Williams B58A00735 Macropoxy 2600, Tnemec Series N69 Hi Build Epoxoline, Carboline Carboguard 888 or equal at 3 to 5 mils DFT.
      f. Finish: Sherwin Williams B65WJ0311 Hi-Solids Polyurethane 250, Tnemec Series 73 Endurashield, Carboline Carbothane 134 HG or equal at 2.5 to 5 mils DFT.
   3. Exterior Ferrous Metal, Ductile Iron Pipe, Misc. Items
      a. Surface Preparation: SSPC-SP-6
      b. Shop Coat: FC Tnemec N69 Hi Build Epoxoline, Carboline Carboguard 890, Sherwin Williams Macropoxy 646 or equal at 2 to 3 mils DFT.
      c. Field Preparation: Pressure wash, touch up with Tnemec N69 Hi Build Epoxoline, Carboline Carboguard 890, Sherwin Williams Macropoxy 646 FC or equal.
      d. Field Prime/Intermediate Coat: Tnemec Series N69 Hi Build, Carboline Carboguard 890, Sherwin Williams Macropoxy 646 FC or equal at 3 to 5 mils DFT.
      e. Finish Coat: Sherwin Williams Hi-Solids Polyurethane 250, Tnemec Series 73 Endurashield, Carboline Carbothane 134 HG or equal at 2.5 to 5 mils DFT.

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4. Exterior Galvanized Steel (where called for on Drawings or Specifications)
    a. Surface Preparation: All galvanized items shall be lightly brush blasted to achieve a surface profile between 1.0-2.0 mils.
    b. Prime: Sherwin Williams B58W00610 Macropoxy 646, FC Tnemec Series 27 Typoxy, Carboline Galoseal WB or equal at 2.5 to 3.5 mils DFT.
    c. Finish: Sherwin Williams B65WJ0311 Hi-Solids Polyurethane 250, Tnemec Series 73 Endurashield, Carboline Carbothane 134 HG or equal at 1.5 to 3 mils DFT.

D. Concrete Surfaces in Chemical Containment Areas
1. Surface Preparation
    a. Concrete floors and containment walls shall be brush blast cleaned or mechanically abraded to remove laitance, hardeners, curing compounds, and sealers to provide a surface profile conforming to SSPC-SP13, ICRI CSP3 standards.
    b. All spent abrasive residues shall be vacuumed cleaned from all surfaces and properly disposed of by law.
    c. Prior to coating, cure concrete for a period of 28 days.
    d. The surface temperature of all concrete scheduled to be coated shall be within the stated tolerance as shown on the manufactures printed data sheets.
    e. Fill voids and cracks with Sherwin Williams Dura-Plate 2300, Tnemec Series 218 MortarClad, or equal. Apply a "cove radius" at all cold joints.
    f. Test for capillary moisture in concrete by affixing plastic sheets to the slab and walls as per ASTM 4263.
    g. The coating applicator shall perform an elcometer adhesion test after the brush blasting of concrete. Test dollies shall be affixed and pulled in accordance with ASTM D4541. The surface tensile strength shall exceed 200 psi. A lower reading will require additional surface preparation.
    h. The coating contractor shall report and surface defects or conditions which would adversely affect coating adhesion. Beginning of installation means acceptance of existing substrate conditions.
2. Priming and Finishing
    a. Vertical Surfaces
        1) Trowel apply Sherwin Williams Dura-Plate 2300, Tnemec Series 218 MortarClad, Carboline Carboguard 510 or equal, filling all voids in the concrete. A rolled cove radius shall be installed at all vertical and horizontal cold joints. Then apply TWO coats of Tnemec Series 282 or Sherwin Williams Cor-Cote HCR.
    b. Floor Slab and Tank Pads
        1) Apply first coat of Tnemec 282, at 4 to 6 mils DFT; broadcast aggregate into the wet film to achieve a non-skid finish. Apply a finish coat of Tnemec Series 282 or equal at 6 to 8 mils DFT. Please Contact Sherwin Williams Protective and Marine Coatings for the Appropriate System Based on Secondary Containment Requirements.

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2.04 BREATHABLE MASONRY COATINGS

A. Basis-of-Design Product: The specified breathable masonry coating is based on Sikagard 701W, Solvent-free Siloxane Emulsion Concentrate, manufactured by Sika Corporation. Subject to compliance with requirements, provide the named product or a comparable product by one of the following:
   1. BASF, Enviroseal 7
   2. ChemMasters, Aquanil

B. Viscosity: Approximately 5 – 20 cps

C. Percent Solids: 50% (silane modified siloxane polymer)

D. Dilute product per manufacturer’s recommended rates to create a colorless, clear coating.

PART 3 - EXECUTION

3.01 GENERAL

A. Colors shall be selected and approved by Engineer. If required, panels for finish and color shall be prepared with materials specified, for Engineer's approval, prior to starting painting work.

B. Employ only skilled painters.

3.02 INSPECTION

A. Examine surfaces scheduled to receive paint and finishes for conditions that will adversely affect execution, permanence or quality of work and which cannot be put into an acceptable condition through preparatory work.

B. Do not proceed with surface preparation or coating application until conditions are suitable and in accordance with manufacturer's printed instructions.

3.03 PREPARATION

A. Prepare surface for painting as described in Coating Schedule and as specified herein.

B. Basic Steps
   1. Arrange to do preparation and paint work in heated enclosure unless ambient weather conditions ensure still, dry air and 50 degrees F temperature. Do not apply paints to surfaces in direct sunlight. Conform to manufacturer's printed instructions for safety requirements.
   2. Coordinate cleaning and painting operations to eliminate contamination of one by the other.
   3. Maintain coating materials at manufacturer's recommended mixing and application temperatures for not less than 24 hours before use. Have clean, proper containers, spray equipment, applicators and accessory items ready for use before decanting or mixing paint materials.
   4. Ensure proper coordination of materials to be applied hereunder with previous coatings on affected surfaces. Have manufacturer's written direction on hand, and follow them strictly except where otherwise specified.

5. Carefully coordinate preparation and material compatibility requirements with shop coated items.

C. Before any paint application, carefully clean surfaces of dust, dirt, grease, loose rust, mill scale, paint unsuitable for top coating, efflorescence, oil, moisture, foreign matter or conditions detrimental to coating bond and durability.
   1. Following cleaning, apply preparatory treatment in strict accordance with manufacturer's written instructions.
   2. Fill imperfections and holes in surfaces to be painted.

D. Concrete for Paint Finishes:
   1. Clean thoroughly of form oil, release agents, dirt, dust, grease, paint, loose material and foreign matter. Remove laitance, roughen smooth surfaces by brush sand blasting, remove fins and projections, fill voids and honeycombs.
   2. Prime where required, after concrete has dried, in strict accordance with manufacturer's printed instructions.

E. Provide higher degree of cleaning for acceptable equivalent paint products when paint manufacturer recommends in his printed surface preparation recommendations.

3.04 TOUCH-UP

A. Before applying field coat, touch-up abraded areas of shop coats with paint of the same type. Apply an entire coat if necessary. Touch-up coats are in addition to, and not a substitute for first field coat. Clean deteriorated surfaces to bare metal before applying touch-up coat.

B. Equipment, motors, pumps and similar items with shop coats, paint filler, enamel or other treatment customary with manufacturer; after installation, touch-up scratches and blemishes before applying field coats.

3.05 APPLICATION

A. Apply number of coats as called for in the Coating Schedule or minimum of one under coat and one finish coat to previously primed surfaces. Following careful inspection of surfaces not previously primed, prepare and clean as specified, apply proper prime coat and minimum of 1 undercoat and 1 finish coat. Refer to Coating Schedule. Where two or more coats are called for each coat shall be of a different tint.

B. Conditions
   1. Do not apply paints or other finish to wet and damp surfaces, except in accordance with instructions of manufacturer. Do not apply exterior paint during cold, rainy, or frosty weather, or when temperature is likely to drop to freezing. Avoid painting of surfaces while they are exposed to the sun.
   2. Paint surfaces which have been cleaned, pretreated or otherwise prepared for painting with first field coat as soon as practicable after such preparation has been completed, but in any event prior to deterioration of prepared surface.
   3. Coat blast cleaned metal surfaces in accordance with SSPC guidelines, before any rusting or other deterioration or contamination of the surface occurs. Do not coat blast

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cleaned surfaces later than 8 hours after cleaning under ideal conditions or sooner if conditions are not ideal.

C. Methods
   1. Spraying with adequate apparatus may be substituted for brush application of suitable paints and in locations suitable for spraying.
   2. Prepare surfaces, mix and apply paint materials in strict accordance with manufacturer's printed instructions and recommendations, except where specifically directed otherwise. Control temperature of materials upon mixing and applications, surface temperature and condition, thinning and modifying.
   3. Protect surfaces to be coated before, during and after application unless ambient weather conditions are favorable.

D. Workmanship
   1. Spot prime with aluminum paints, exposed nails and other ferrous metal on surfaces to be painted with water-thinned paints.
   2. Apply coating materials to meet manufacturer's spreading rate and dry film thickness recommendations. Dry film thicknesses specified are constant for brush, spray, roller or other form of application.
      a. Control thinning in accordance with V.O.C. regulations for spray use and to manufacturer's printed instructions, and produce specified dry film thickness on level surfaces, interior and exterior angles.
      b. Record quantities of materials of each type, for each coat, used in each location.
   3. Apply paints and coatings using skilled painters, brushed or rolled out carefully to a smooth, even coating without runs or sags. Flow enamel on evenly and smoothly. Allow each coat of paint to dry thoroughly, on the surface and throughout the film thickness, before the next coat is applied. High polymer coatings may be exempted from the drying requirement if recoat time is specified by manufacturer.
   4. Finish Surfaces - Uniform in finish and color, and free from flash spots and brush marks.
   5. Accessory items, lighting fixtures, escutcheons, plates, trim and similar finish items not to be painted. Remove or carefully mask before painting adjacent surfaces. Carefully replace and reposition upon completion of adjacent painting and cleaning work.

3.06 PROTECTION, CLEAN-UP

A. Protect materials and surfaces painted or coated under this section, both before and after application. Also protect adjacent work and materials by the use of sufficient drop cloths during the progress of this work. Upon completion of the work, clean up paint spots, oil, and stains from floors, glass, hardware, and similar finished items.

3.07 FINAL TOUCH-UP

A. Prior to final completion and acceptance, examine painted and finished surfaces and retouch or refinish as necessary and required to leave surfaces in perfect condition.

B. After each door has been fitted and hung, refinish edges, tops and bottom.

END OF SECTION

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SECTION 22 05 23
GENERAL – DUTY VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.

1.02 DESCRIPTION

A. Work covered by this section includes the furnishing and installing of process valves where shown on the Drawings and specified herein.

B. Also included are valves located within underground valve pits, vaults and structures, where shown on the drawings and specified herein.

C. Related work specified elsewhere includes:
   1. Section 099600 – High Performance Coatings

D. Provide all valves and auxiliary equipment required for complete and proper operation of all systems, whether or not they are specifically described.

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. Valves shall be of ample strength to withstand and operate satisfactorily under the specified pressures.

C. 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 will not be permitted.

D. The products specified herein shall be furnished by a manufacturer who is regularly engaged in the manufacture and production of such products designed for use in wastewater treatment, and shall have not less than 5 years' experience in supplying the specified product. Products which do not meet the 5 year experience period will be considered if the product supplier or manufacturer provides a bond or cash deposit, commencing on the date of product acceptance by the Owner until 5 years from the date of substantial completion, which will guarantee replacement of that product in the event of failure, in accordance with the guaranteed requirements specified herein.

E. Equipment substitutions shall be in accordance with the requirements of Section 013300 Submittals. Any redesign of the work required as a result of the proposed substitution shall be designed and stamped, completed at no additional cost to the Owner and as approved by the Engineer.

1.04 SUBMITTALS

A. See Section 013300– Submittals.

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. Manufacturers' Certificate of Compliance.

E. Manufacturer's installation instructions, including any limitations on installation.

F. Submit automatic actuator test/calibration test report as specified herein.

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.

1.06 GUARANTEE

A. For a period of minimum one (1) year from date of substantial completion, manufacturer shall repair or replace, at no additional cost to the Owner, any equipment which 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 include the cost of materials and installation. This paragraph is not intended to void any manufacturer's guarantee or warranties which might be of a duration greater than one (1) year.

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. Threaded: ANSI B2.1, IPS
   2. Mechanical Joint: ANSI A21.11
   3. Flanged Cast Iron: ANSI B16.1
   4. Flanged Ductile Iron: ANSI B16.42
   5. Flanged Steel: ANSI B16.5
   6. Hose Threads: ANSI B2.4
   7. Solder Joints: ANSI B16.18

C. Markings - Mark each valve with manufacturer's name, pressure and like data in accordance with Military Specifications SP-25.

D. Dimensions - ANSI B16.10 for ferrous valves.

E. Pressure Rating - 150 psig (min.), non-shock W.O.G., unless otherwise noted.

F. Materials - Provide valves made of materials suitable for the fluid being conveyed.

2.02 BALL AND BALL CHECK VALVES

A. Operators - For ball valves, a quarter turn handle unless otherwise indicated on the drawings or specified.

B. Bronze Valves - 150 pound WSP, 400 pound WOG, bronze two-piece body, TFE Teflon seats and seals, steel lever handle with stops, chrome-plated brass ball; Jamesbury "Clincher Style 21-11", Watts #B6000, or equal.

C. Polyvinyl Chloride Valves -
   1. Ball Valve: True union type; cross-section area through ball equal to area of pipe; rated in excess of 100 psi; Type I PVC valve with Vinton "O" ring seals and Teflon TFE seats; socket ends; manufactured by Nibco/Chemtrol, Hayward Manufacturing Company, Inc., or equal.
   2. Check: True union type; rated in excess of 100 psi; Type I PVC valve with Vinton "O" ring seals; socket ends unless 3 inches or larger, then flanged ends; manufactured by Nibco/Chemtrol, Hayward Manufacturing Company, Inc., or equal.

D. Stainless Steel:
   1. 1000 WOG, 316 SST body, ball and stem, TFE Teflon seats and seals, 304 SST lever and handle with stops. Flow-Tek Model S40; equivalent by Jamesbury; or equal.

2.03 GATE VALVES - LARGER THAN TWO INCHES

A. Construction - Ductile Iron body, bonnet and wedge, bronze stem or stainless steel Grade 304 stem, resilient-seat wedge, non-rising stem gate valves conforming to AWWA C509. The wedge shall be ductile iron, encapsulated with EPDM rubber to create a seal in both directions, at rated pressure in the closed position. Pressure containing components shall have thick wall per AWWA C509 Section 4.4 table 1. All external fasteners (bolts and nuts) are to be stainless steel Grade 304. Valves shall be 250 pound unless the pipe to which the valve is attached has a higher class rating.

B. Acceptable Manufacturers - American-Darling, Kennedy Valve Mfg. Co., Inc., or equal.

C. Operators:
   1. Handwheels shall be turned counterclockwise to open valves. Handwheels shall be of ample size and shall have an arrow and the word OPEN cast thereon to indicate the direction of opening.
   2. Where indicated on the drawings or necessary due to location, size, or inaccessibility, furnish geared or chain wheel operators with the valves. Design such operators to have adequate strength for use with the valves with which they are supplied.

D. Indicators - Equip valves, 4 inches and larger, with needle and slot position indicators, properly geared to show the position of the valve disc with reasonable accuracy at all points of travel. Locate indicators so that they may be easily read, yet not un-necessarily exposed to injury. Moving parts shall be bronze.

E. Packing - Valves shall be capable of being repacked and o-rings changed under pressure.

F. Water Drain - On shut-off valves serving exterior sillcocks, pipelines, and equipment, provide valve with a waste drain so that exterior portions of the system may be drained.

2.04 GLOBE VALVES

A. Globe valves 3 inches and smaller shall be all-bronze with screwed ends, union bonnet, inside screw, rising stem, and TFE disc. Valves shall be rated 150-pound, SWP, 300-pound WOG, and shall be Stockham Figure B-22T; Crane Co. Cat. No. 7TF; or equal.

2.05 HOSE BIB VALVES

A. Inside Hose Connection – Type 316 stainless steel ball valve with NPT screwed ends, and NPT by NST hose thread adapter outlet connection. Valves shall be rated 150-pound SP, 300-pound WOG.

2.06 PLANT WATER HYDRANT

A. Hydrant shall be 2-1/8 inch Mueller Number A411 post type fire hydrant with NPT inlet and two 1-1/2 inch replaceable hose nozzles. The outlets shall match existing hydrants at the plant.

2.07 OPERATORS

A. Chain Wheel Operators - Install for manually operated valves wherever the normal operating wheel, nut, or handle is greater than 5 feet from the floor; or wherever else shown or specified. Install sufficient chain length, guides and bevel gears to permit the proper operation of the valve at a hand height of 5 feet.
   1. Provide Figure F-5680 by Clow Corporation, the equivalent manufactured by Mueller Co. or equal.

B. Gear Operators - Provide where shown or specified. Provide either enclosed bevel or spur-gear type, manufactured by Clow Corp., Mueller Co., or equal.

C. Floor Stand - Indicating type, non-rising stainless steel stem; F-5505 manufactured by Clow; equivalent manufactured by M&H; or equal. Provide pipe extension stem with stem guides M&H style 3801; equivalent by Clow; or equal.

2.08 IDENTIFICATION OF VALVES

A. Provide each exposed valve with a 1-1/2 inches minimum, heavy stainless steel tag bearing the valve designation assigned by the Owner.

B. The lettering shall be 1/2 inch high, block type, stamped on, and filled with black enamel.

C. Provide split-key rings and attach each tag to the proper valve.

2.09 VALVE MAINTENANCE EQUIPMENT AND MATERIALS

A. Provide two sets of special tools, for each type of valve, which are recommended by the valve manufacturers for proper operation and maintenance of valves.

B. Where grease lubrication of valves is required, provide two grease guns of proper capacity.

C. For valves requiring lubrication, provide one quart of each type of lubricant for every five valves or fraction thereof. Type of lubricant shall be as recommended by the valve manufacturer.

PART 3 - EXECUTION

3.01 INSPECTION

A. Before installation begins, inspect and verify that the Work is complete and correct, to the point where this installation may properly commence.

B. In the event of interference, immediately notify the Engineer.

C. Do not proceed with installations 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 INSTALLATIONS

A. General - Install valves where shown on the drawings, where required, or where directed by Engineer. Install in accordance with manufacturers' recommendations.

B. Interior and Exposed Valves - Position valves so as not to cause hazards and to insure easy and convenient operation. If in question, consult with Engineer to determine the exact location and orientation of valves.

C. Valve Tags - Securely attach valve identification tags to all valves.

3.04 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.

3.05 FIELD QUALITY CONTROL

A. Upon completion of installation, test all valves in the presence of the Engineer or the plumbing or building inspector, in accordance with the requirements of local or applicable plumbing or building code.

B. Furnish all materials, equipment, tools and labor for testing.

C. Valves which carry water or liquid under pressure shall be filled with water and subjected to a pressure of 100 psig or 1-1/2 times the normal working pressure, whichever is greater, for a period of 2 hours or longer as may be necessary to examine the valve for leaks.

D. Should leaks be found, repair faulty joints. Caulking of threads or the use of chemical compounds to correct leaks will not be permitted. Replace defective valves and retest until test requirements are met to the satisfaction of the Engineer.

3.06 FINISHING

A. Non-ferrous valves do not require field coatings.

B. Ferrous surfaces, including flange faces, obviously not to be painted shall be given a shop coat of grease or other suitable rust-resistant coating.

C. Interior and exposed valves shall be thoroughly cleaned, prepared for painting, and painted as specified in Section 099600, except that the epoxy finishes specified in Part 2 of this Section shall take precedence.

D. Repair and refinish any scratched or damaged surfaces.

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SECTION 26 05 05
SELECTIVE DEMOLITION FOR ELECTRICAL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electrical demolition.

1.02 RELATED REQUIREMENTS

A. Section 017000 - Execution and Closeout Requirements: Additional requirements for alterations work.

B. Section 028400 - Polychlorinate Biphenyl (PCB) Remediation: Removal of equipment and materials containing substances regulated under the Federal Toxic Substances Control Act (TSCA), including but not limited to those containing PCBs and mercury.

1.03 SUBMITTALS

A. See Section 013000 - 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. Beginning of demolition means installer accepts existing conditions.

3.02 PREPARATION

A. 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.

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

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

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

3.04 CLEANING AND REPAIR

A. Clean and repair existing materials and equipment that remain or that are to be reused.

B. 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.

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SECTION 26 05 19
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. Wire pulling lubricant.

F. Cable ties.

1.02 RELATED REQUIREMENTS

A. Section 260505 - Selective Demolition for Electrical: Disconnection, removal, and/or extension of existing electrical conductors and cables.

B. Section 260526 - Grounding and Bonding for Electrical Systems: Additional requirements for grounding conductors and grounding connectors.

C. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire; 2013 (Reapproved 2024).

B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft; 2023.

C. ASTM B33 - Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes; 2010, with Editorial Revision (2020).

D. ASTM B787/B787M - Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation; 2004 (Reapproved 2020).

E. ASTM D3005 - Standard Specification for Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape; 2024.

F. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.

G. NECA 120 - Standard for Installing Armored Cable (AC) and Type Metal-Clad (MC) Cable; 2018.

H. NECA 121 - Standard for Installing Nonmetallic-Sheathed Cable (Type NM-B) and Underground Feeder and Branch-Circuit Cable (Type UF); 2024.

I. NEMA WC 70 - Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy; 2021.

J. NETA ATS - Standard for Acceptance Testing Specifications for Electrical Power Equipment And Systems; 2025.

K. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

L. UL 44 - Thermoset-Insulated Wires and Cables; Current Edition, Including All Revisions.

M. UL 83 - Thermoplastic-Insulated Wires and Cables; Current Edition, Including All Revisions.

N. UL 267 - Outline of Investigation for Wire-Pulling Compounds; Current Edition, Including All Revisions.

O. UL 486A-486B - Wire Connectors; Current Edition, Including All Revisions.

P. UL 486C - Splicing Wire Connectors; Current Edition, Including All Revisions.

Q. UL 493 - Thermoplastic-Insulated Underground Feeder and Branch-Circuit Cables; Current Edition, Including All Revisions.

R. UL 510 - Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape; Current Edition, Including All Revisions.

S. 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 Engineer of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

A. See Section 013000 - 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. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

D. Project Record Documents: Record actual installed circuiting arrangements. Record actual routing for underground circuits.

1.06 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

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

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

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store 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 Engineer 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.

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 260526.

H. Conductor Material:
   1. Provide copper conductors only. Aluminum conductors are not acceptable for this project. Conductor sizes indicated are based on copper.
   2. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B787M unless otherwise indicated.
   3. Tinned Copper Conductors: Comply with ASTM B33.

I. Minimum Conductor Size:
   1. Branch Circuits: 12 AWG.
      a. Exceptions:
         1) 20 A, 120 V circuits longer than 75 feet (23 m): 10 AWG, for voltage drop.
         2) 20 A, 120 V circuits longer than 150 feet (46 m): 8 AWG, for voltage drop.
         3) 20 A, 277 V circuits longer than 150 feet (46 m): 10 AWG, for voltage drop.
   2. Control Circuits: 14 AWG.

J. 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:
         1) Phase A: Brown.
         2) Phase B: Orange.
         3) Phase C: Yellow.
         4) Neutral/Grounded: Gray.
      b. 208Y/120 V, 3 Phase, 4 Wire System:
         1) Phase A: Black.

2) Phase B: Red.
3) Phase C: Blue.
4) Neutral/Grounded: White.

c. Equipment Ground, All Systems: Green.
d. For control circuits, comply with manufacturer's recommended color code.

2.03 SINGLE CONDUCTOR BUILDING WIRE

A. Description: Single conductor insulated wire.

B. Conductor Stranding:

1. Feeders and Branch Circuits:
   a. Size 10 AWG and Smaller: Solid.
   b. Size 8 AWG and Larger: Stranded.
2. Control Circuits: Stranded.

C. Insulation Voltage Rating: 600 V.

D. Insulation:
1. Copper Building Wire: Type THHN/THWN or THHN/THWN-2, except as indicated below.
   a. Installed Underground: Type XHHW-2.

2.04 METAL-CLAD CABLE

A. 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.

B. Conductor Stranding:
1. Size 10 AWG and Smaller: Solid.
2. Size 8 AWG and Larger: Stranded.

C. Insulation Voltage Rating: 600 V.

D. Insulation: Type THHN, THHN/THWN, or THHN/THWN-2.

E. Provide dedicated neutral conductor for each phase conductor.

F. Grounding: Full-size integral equipment grounding conductor.

G. Armor: Steel, interlocked tape.

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. Wiring Connectors for Splices and Taps:
1. Copper Conductors Size 8 AWG and Smaller: Use mechanical connectors.
2. Copper Conductors Size 6 AWG and Larger: Use mechanical connectors.

C. Wiring Connectors for Terminations:
1. Copper Conductors Size 8 AWG and Larger: Use mechanical connectors where connectors are required.
2. Conductors for Control Circuits: Use crimped terminals for all connections.

D. Do not use insulation-piercing or insulation-displacement connectors designed for use with conductors without stripping insulation.

E. Do not use push-in wire connectors as a substitute for twist-on insulated spring connectors.

F. Mechanical Connectors: Provide bolted type or set-screw type.

G. Crimped Terminals: Nylon-insulated, with insulation grip and terminal configuration suitable for connection to be made.

2.06 ACCESSORIES

A. Electrical Tape:
1. Vinyl Color Coding Electrical Tape: Integrally colored to match color code indicated; listed as complying with UL 510; minimum thickness of 7 mil (0.18 mm); resistant to abrasion, corrosion, and sunlight; suitable for continuous temperature environment up to 221 degrees F (105 degrees C).
2. Vinyl Insulating Electrical Tape: Complying with ASTM D3005 and listed as complying with UL 510; minimum thickness of 7 mil (0.18 mm); resistant to abrasion, corrosion, and

sunlight; conformable for application down to 0 degrees F (-18 degrees C) and suitable for continuous temperature environment up to 221 degrees F (105 degrees C).

B. Wire Pulling Lubricant:
   1. Listed and labeled as complying with UL 267.
   2. Suitable for use with conductors/cables and associated insulation/jackets to be installed.
   3. Suitable for use at installation temperature.

C. 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. Circuiting Adjustments: Unless otherwise indicated, when branch circuits are indicated as separate, combining them together in a single raceway is not permitted.
   6. Common Neutrals: Unless otherwise indicated, sharing of neutral/grounded conductors among single phase branch circuits of different phases installed in the same raceway is not permitted. Provide dedicated neutral/grounded conductor for each individual branch circuit.

B. Install products in accordance with manufacturer's instructions.

C. Perform work in accordance with NECA 1 (general workmanship).

D. Install metal-clad cable (Type MC) in accordance with NECA 120.

E. 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.

F. Paralleled Conductors: Install conductors of the same length and terminate in the same manner.

G. 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.

H. 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.

I. Install conductors with a minimum of 12 inches (300 mm) of slack at each outlet.

J. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.

K. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.

L. 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.

M. 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.

N. Insulate ends of spare conductors using vinyl insulating electrical tape.

O. 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.

P. 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 014000 - 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.

D. Correct deficiencies and replace damaged or defective conductors and cables.

END OF SECTION

SECTION 26 05 26
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Grounding and bonding requirements.

B. Conductors for grounding and bonding.

C. Connectors for grounding and bonding.

1.02 RELATED REQUIREMENTS

A. Section 260519 - Low-Voltage Electrical Power Conductors and Cables: Additional requirements for conductors for grounding and bonding, including conductor color coding.

B. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.

B. NEMA GR 1 - Grounding Rod Electrodes and Grounding Rod Electrode Couplings; 2022.

C. NETA ATS - Standard for Acceptance Testing Specifications for Electrical Power Equipment And Systems; 2025.

D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

E. UL 467 - Grounding and Bonding Equipment; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Verify exact locations of underground metal water service pipe entrances to building.
   2. Notify Engineer 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 013000 - 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. Project Record Documents: Record actual locations of grounding electrode system components and connections.

1.06 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

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

D. Installer Qualifications for Signal Reference Grids: Company with minimum five years documented experience with high frequency grounding systems.

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 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. Bonding and Equipment Grounding:
   1. Provide bonding for equipment grounding conductors, equipment ground busses, metallic equipment enclosures, metallic raceways and boxes, device grounding terminals, and other normally non-current-carrying conductive materials enclosing electrical conductors/equipment or likely to become energized as indicated and in accordance with NFPA 70.
   2. Provide insulated equipment grounding conductor in each feeder and branch circuit raceway. Do not use raceways as sole equipment grounding conductor.
   3. Where circuit conductor sizes are increased for voltage drop, increase size of equipment grounding conductor proportionally in accordance with NFPA 70.
   4. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
   5. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on neutral (grounded) or isolated/insulated ground bus.
   6. Provide bonding jumper across expansion or expansion/deflection fittings provided to accommodate conduit movement.

2.02 GROUNDING AND BONDING COMPONENTS

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

B. Conductors for Grounding and Bonding, in Addition to Requirements of Section 260526:
   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).
         3) Use bare copper conductors as noted on drawings..

C. Connectors for Grounding and Bonding:
   1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.

2. Unless otherwise indicated, use exothermic welded connections for underground, concealed and other inaccessible connections.
3. Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.

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

D. Identify grounding and bonding system components in accordance with Section 260553.

3.03 FIELD QUALITY CONTROL

A. See Section 014000 - 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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SECTION 26 05 29
HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

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

1.02 RELATED REQUIREMENTS

A. Section 033000 - Cast-in-Place Concrete: Concrete equipment pads.

B. Section 260533.13 - Conduit for Electrical Systems: Additional support and attachment requirements for conduits.

C. Section 260533.16 - Boxes for Electrical Systems: Additional support and attachment requirements for boxes.

D. Section 265600 - Exterior Lighting: Additional support and attachment requirements for exterior luminaires.

1.03 REFERENCE STANDARDS

A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2024.

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.

C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2023.

D. MFMA-4 - Metal Framing Standards Publication; 2004.

E. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.

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 actual equipment and components to be installed.
   2. Coordinate work to provide additional framing and materials required for installation.
   3. Coordinate compatibility of support and attachment components with mounting surfaces at installed locations.
   4. Coordinate arrangement of supports with ductwork, piping, equipment and other potential conflicts.
   5. Notify Engineer of 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 cured; see Section 033000.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.06 QUALITY ASSURANCE

A. Maintain at project site one copy of each referenced document that prescribes execution requirements.

B. Product Listing Organization Qualifications: Organization recognized by OSHA as 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. Comply with the following. Where requirements differ, comply with most stringent.
      a. NFPA 70.
      b. Requirements of authorities having jurisdiction.
   2. Provide required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for complete installation of electrical work.
   3. Provide products listed, classified, and labeled as suitable for purpose intended, where applicable.
   4. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for load to be supported with minimum safety factor of 25%. Include consideration for vibration, equipment operation, and shock loads where applicable.
   5. Do not use products for applications other than as permitted by NFPA 70 and product listing.
   6. Steel Components: Use corrosion-resistant materials suitable for 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 and clamps suitable for 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 and brackets suitable for boxes to be supported.

D. Metal Channel/Strut Framing Systems:
   1. Description: Factory-fabricated, continuous-slot, metal channel/strut and associated fittings, accessories, and hardware required for field assembly of supports.
   2. Comply with MFMA-4.

E. Hanger Rods: Threaded, zinc-plated steel unless otherwise indicated.

F. Anchors and Fasteners:
   1. Unless otherwise indicated and where not otherwise restricted, use anchor and fastener types indicated for specified applications.

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. Install hangers and supports in accordance with NECA 1.

C. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.

D. Unless specifically indicated or approved by Engineer, do not provide support from roof deck.

E. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.

F. 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 to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
   3. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.

G. Conduit Support and Attachment: See Section 260533.13 for additional requirements.

H. Box Support and Attachment: See Section 260533.16 for additional requirements.

I. Exterior Luminaire Support and Attachment: See Section 265600 for additional requirements.

J. Secure fasteners in accordance with manufacturer's recommended torque settings.

K. Remove temporary supports.

3.03 FIELD QUALITY CONTROL

A. See Section 014000 - 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.

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SECTION 26 05 33.13
CONDUIT FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Galvanized steel intermediate metal conduit (IMC).

B. Flexible metal conduit (FMC).

C. Liquidtight flexible metal conduit (LFMC).

D. Rigid polyvinyl chloride (PVC) conduit.

E. Liquidtight flexible nonmetallic conduit (LFNC).

1.02 RELATED REQUIREMENTS

A. Section 260519 - Low-Voltage Electrical Power Conductors and Cables: Cable assemblies consisting of conductors protected by integral metal armor.

B. Section 260526 - Grounding and Bonding for Electrical Systems.

C. Section 260529 - Hangers and Supports for Electrical Systems.

D. Section 260533.16 - Boxes for Electrical Systems.

E. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC); 2020.

B. ANSI C80.3 - American National Standard for Electrical Metallic Tubing -- Steel (EMT-S); 2020.

C. ANSI C80.6 - American National Standard for Electrical Intermediate Metal Conduit; 2018.

D. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.

E. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT); 2020.

F. NECA 111 - Standard for Installing Nonmetallic Raceways (RNC, ENT, LFNC); 2025.

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; 2020.

I. NEMA TC 3 - Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing; 2021.

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 Metal Conduit; Current Edition, Including All Revisions.

N. UL 514B - Conduit, Tubing, and Cable Fittings; Current Edition, Including All Revisions.

O. UL 651 - Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings; Current Edition, Including All Revisions.

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

Q. 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 actual type and quantity of conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
2. Coordinate arrangement of conduits with structural members, ductwork, piping, equipment, and other potential conflicts.
3. Verify exact conduit termination locations required for boxes, enclosures, and equipment.
4. Notify Engineer of conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

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

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittals procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for conduits and fittings.

1.06 QUALITY ASSURANCE

A. Documents at Project Site: Maintain at project site one copy of manufacturer's instructions and shop drawings.

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

1.07 DELIVERY, STORAGE, AND HANDLING

A. See Section 017419 - Construction Waste Management and Disposal for packaging waste requirements.

B. 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, manufacturer's instructions, and product listing.

B. Unless otherwise indicated and where not otherwise restricted, use conduit types indicated for specified applications. Where more than one listed application applies, comply with most restrictive requirements. Where conduit type for particular application is not specified, use galvanized steel rigid metal conduit.

C. Underground:
1. Under Slab on Grade: Use rigid PVC conduit.
2. Exterior, Direct-Buried: Use rigid PVC conduit.

D. Exposed, Exterior, Not Subject to Severe Physical Damage: Use galvanized steel intermediate metal conduit (IMC).

E. Exposed, Exterior, Subject to Severe Physical Damage: Use galvanized steel intermediate metal conduit (IMC).

F. Flexible Connections to Vibrating Equipment:
1. Dry Locations: Use flexible metal conduit (FMC).
2. Damp, Wet, or Corrosive Locations: Use liquidtight flexible metal conduit (LFMC).
3. Maximum Length: 6 feet (1.8 m) unless otherwise indicated.

2.02 CONDUIT - GENERAL REQUIREMENTS

A. Comply with NFPA 70.

B. 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 mandrel through them.

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

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

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

F. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

2.03 GALVANIZED STEEL INTERMEDIATE METAL CONDUIT (IMC)

A. Description: NFPA 70, Type IMC galvanized steel intermediate metal conduit complying with ANSI C80.6 and listed and labeled as complying with UL 1242.

B. Fittings:
   1. Nonhazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B or UL 1242.
   2. Material: Use steel or malleable iron.
   3. Connectors and Couplings: Use threaded type fittings only. Threadless fittings, including set screw and compression/gland types, are not permitted.

2.04 FLEXIBLE METAL CONDUIT (FMC)

A. Description: NFPA 70, Type FMC standard-wall steel flexible metal conduit listed and labeled as complying with UL 1, and listed for use in classified firestop systems.

B. Fittings:
   1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
   2. Material: Use steel or malleable iron.

2.05 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)

A. Description: NFPA 70, Type LFMC polyvinyl chloride (PVC) jacketed steel flexible metal conduit listed and labeled as complying with UL 360.

B. Fittings:
   1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
   2. Material: Use steel or malleable iron.

2.06 RIGID POLYVINYL CHLORIDE (PVC) CONDUIT

A. Description: NFPA 70, Type PVC rigid polyvinyl chloride conduit complying with NEMA TC 2 and listed and labeled as complying with UL 651; Schedule 40 unless otherwise indicated, Schedule 80 where subject to physical damage; rated for use with conductors rated 90 degrees C.

B. Fittings:
   1. Manufacturer: Same as manufacturer of conduit to be connected.
   2. Description: Fittings complying with NEMA TC 3 and listed and labeled as complying with UL 651; material to match conduit.

2.07 LIQUIDTIGHT FLEXIBLE NONMETALLIC CONDUIT (LFNC)

A. Description: NFPA 70, Type LFNC liquidtight flexible nonmetallic conduit listed and labeled as complying with UL 1660.

B. 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 type of conduit to be connected.

2.08 ACCESSORIES

A. Solvent Cement for PVC Conduit and Fittings: As recommended by manufacturer of conduit and fittings to be installed.

B. Pull Strings: Use nylon or polyester tape with average breaking strength of not less than 1,250 lbf (5.6 kN).

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. Install conduit in accordance with NECA 1.

C. Intermediate Metal Conduit (IMC): Install in accordance with NECA 101.

D. Rigid Polyvinyl Chloride (PVC) Conduit: Install in accordance with NECA 111.

E. Liquidtight Flexible Nonmetallic Conduit (LFNC): Install in accordance with NECA 111.

F. Conduit Support:
   1. Secure and support conduits in accordance with NFPA 70 using suitable supports and methods approved by authorities having jurisdiction; see Section 260529.
   2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
   3. Where conduit support intervals specified in NFPA 70 and NECA standards differ, comply with most stringent requirements.

G. Connections and Terminations:
   1. Use suitable adapters where required to transition from one type of conduit to another.
   2. Provide drip loops for liquidtight flexible conduit connections to prevent drainage of liquid into connectors.
   3. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.
   4. Provide insulating bushings, insulated throats, or listed metal fittings with smooth, rounded edges at conduit terminations to protect conductors.
   5. Secure joints and connections to provide mechanical strength and electrical continuity.

H. Penetrations:
   1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.
   2. Make penetrations perpendicular to surfaces unless otherwise indicated.
   3. Conceal bends for conduit risers emerging above ground.

I. Underground Installation:

1. Provide underground warning tape along entire conduit length; see Section 260553.

J. 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.

K. Provide grounding and bonding; see Section 260526.

L. Identify conduits; see Section 260553.

3.03 FIELD QUALITY CONTROL

A. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.

B. Correct deficiencies and replace damaged or defective conduits.

3.04 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.

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SECTION 26 05 33.16
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. Underground boxes/enclosures.

1.02 RELATED REQUIREMENTS

A. Section 083100 - Access Doors and Panels: Panels for maintaining access to concealed boxes.

B. Section 260526 - Grounding and Bonding for Electrical Systems.

C. Section 260529 - Hangers and Supports for Electrical Systems.

D. Section 260533.13 - 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.

E. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

F. Section 262726 - Wiring Devices:
   1. Wall plates.
   2. Additional requirements for locating boxes for wiring devices.

1.03 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.

B. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2016.

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 (Reaffirmed 2020).

E. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

F. SCTE 77 - Specifications for Underground Enclosure Integrity; 2023.

G. UL 514A - Metallic Outlet Boxes; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
   2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
   3. Coordinate 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. Notify Engineer of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for cabinets and enclosures, boxes for hazardous (classified) locations, floor boxes, and underground boxes/enclosures.
   1. Underground Boxes/Enclosures: Include reports for load testing in accordance with SCTE 77 certified by a professional engineer or an independent testing agency upon request.

C. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

D. Project Record Documents: Record actual locations for outlet and device boxes, pull boxes, cabinets and enclosures, and underground boxes/enclosures.

1.06 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. 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 cast iron boxes or cast aluminum boxes where exposed intermediate metal conduit (IMC) is used.
   2. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.
   3. Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes unless specifically indicated or permitted.
   4. Wall Plates: Comply with Section 262726.

C. 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: 17" by 31" unless otherwise indicated.

3. Depth: As required to extend below frost line to prevent frost upheaval, but not less than 12 inches (300 mm).
4. Polymer Concrete Underground Boxes/Enclosures: Comply with SCTE 77.
   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. Unless otherwise indicated, boxes may be surface-mounted where exposed conduits are indicated or permitted.

E. Box Locations:
   1. Unless dimensioned, box locations indicated are approximate.
   2. Locate boxes as required for devices installed under other sections or by others.
      a. Switches, Receptacles, and Other Wiring Devices: Comply with Section 262726.
   3. 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 260533.13.

F. Box Supports:
   1. Secure and support boxes in accordance with NFPA 70 and Section 260529 using suitable supports and methods approved by the authority having jurisdiction.
   2. Provide independent support from building structure except for cast metal boxes (other than boxes used for fixture support) supported by threaded conduit connections in accordance with NFPA 70. Do not provide support from piping, ductwork, or other systems.

G. Install boxes plumb and level.

H. Underground Boxes/Enclosures:
   1. Install enclosure on gravel base, minimum 6 inches (150 mm) deep.
   2. Install additional bracing inside enclosures in accordance with manufacturer's instructions to minimize box sidewall deflections during backfilling. Backfill with cover bolted in place.

I. Close unused box openings.

J. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.

K. Provide grounding and bonding in accordance with Section 260526.

L. Identify boxes in accordance with Section 260553.

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.

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SECTION 26 05 53
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. Underground warning tape.

1.02 RELATED REQUIREMENTS

A. Section 260519 - Low-Voltage Electrical Power Conductors and Cables: Color coding for power conductors and cables 600 V and less; vinyl color coding electrical tape.

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

1.03 REFERENCE STANDARDS

A. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

B. UL 969 - Marking and Labeling Systems; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 013000 - 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.

1.05 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

1.06 FIELD CONDITIONS

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

PART 2 PRODUCTS

2.01 IDENTIFICATION REQUIREMENTS

A. Identification for Equipment:
   1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.
      a. 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.
   2. Use identification nameplate to identify disconnect location for equipment with remote disconnecting means.
   3. 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.

4. Use field-painted floor markings, floor marking tape, or warning labels to identify required equipment working clearances where indicated or where required by the authority having jurisdiction.
    a. Field-Painted Floor Markings: Alternating black and white stripes, 3 inches (76 mm) wide, painted in accordance with Section 099123 and 099113.

B. Identification for Conductors and Cables:
1. Color Coding for Power Conductors 600 V and Less: Comply with Section 260519.
2. Use identification nameplate or identification label to identify color code for ungrounded and grounded power conductors inside door or enclosure at each piece of feeder or branch-circuit distribution equipment when premises has feeders or branch circuits served by more than one nominal voltage system.
3. Use wire and cable markers to identify circuit number or other designation indicated for power, control, and instrumentation conductors and cables at the following locations:
    a. At each source and load connection.
    b. Within boxes when more than one circuit is present.
    c. Within equipment enclosures when conductors and cables enter or leave the enclosure.
4. Use wire and cable markers to identify connected grounding electrode system components for grounding electrode conductors.
5. Use underground warning tape to identify direct buried cables.

C. Identification for Boxes:
1. Use identification labels or handwritten text using indelible marker to identify circuits enclosed.

D. Identification for Devices:
1. Wiring Device and Wallplate Finishes: Comply with Section 262726.
2. Use identification label or engraved wallplate to identify serving branch circuit for all receptacles.
3. Use identification label or engraved wallplate to identify load controlled.

2.02 IDENTIFICATION NAMEPLATES AND LABELS

A. Identification Nameplates:
1. Materials:
    a. Indoor Clean, Dry Locations: Use plastic nameplates.
    b. Outdoor Locations: Use plastic, stainless steel, or aluminum nameplates suitable for exterior use.
2. Plastic Nameplates: Two-layer or three-layer laminated acrylic or electrically non-conductive phenolic with beveled edges; minimum thickness of 1/16 inch (1.6 mm); engraved text.
    a. Exception: Provide minimum thickness of 1/8 inch (3 mm) when any dimension is greater than 4 inches (100 mm).
3. Mounting Holes for Mechanical Fasteners: Two, centered on sides for sizes up to 1 inch (25 mm) high; Four, located at corners for larger sizes.

B. Identification Labels:
1. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.
    a. Use only for indoor locations.
2. Text: Use factory pre-printed or machine-printed text. Do not use handwritten text unless otherwise indicated.

C. Format for Equipment Identification:
1. Minimum Size: 1 inch (25 mm) by 2.5 inches (64 mm).
2. Legend:

a. Equipment designation or other approved description.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height:
a. Equipment Designation: 1/2 inch (13 mm).
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).
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.

2.03 WIRE AND CABLE MARKERS

A. Markers for Conductors and Cables: Use wrap-around self-adhesive vinyl cloth or wrap-around self-adhesive vinyl self-laminating type markers suitable for the conductor or cable to be identified.

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

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

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

E. Minimum Text Height: 1/8 inch (3 mm).

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

2.04 UNDERGROUND WARNING TAPE

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

B. Foil-backed Detectable Type Tape: 3 inches (76 mm) wide, with minimum thickness of 5 mil (0.1 mm), unless otherwise required for proper detection.

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

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

2.05 FLOOR MARKING TAPE

A. Floor Marking Tape for Equipment Working Clearance Identification: Self-adhesive vinyl or polyester tape with overlaminate, 3 inches (76 mm) wide, with alternating black and white stripes.

2.06 WARNING SIGNS AND LABELS

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

B. 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.

C. Warning Labels:
   1. Materials: Use factory pre-printed or machine-printed self-adhesive polyester or self-adhesive vinyl labels; UV, chemical, water, heat, and abrasion resistant; produced using materials recognized to UL 969.
   2. Machine-Printed Labels: Use thermal transfer process printing machines and accessories recommended by label manufacturer.
   3. Minimum Size: 2 by 4 inches (51 mm by 102 mm) unless otherwise indicated.

PART 3 EXECUTION

3.01 PREPARATION

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

3.02 INSTALLATION

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

B. Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance. Unless otherwise indicated, locate products as follows:
   1. Surface-Mounted Equipment: Enclosure front.
   2. Free-Standing Equipment: Enclosure front; also enclosure rear for equipment with rear access.
   3. Elevated Equipment: Legible from the floor or working platform.
   4. Branch Devices: Adjacent to device.
   5. Interior Components: Legible from the point of access.
   6. Boxes: Outside face of cover.
   7. Conductors and Cables: Legible from the point of access.
   8. 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 014000 - 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

SECTION 26 05 83
WIRING CONNECTIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electrical connections to equipment.

1.02 RELATED REQUIREMENTS

A. Section 260519 - Low-Voltage Electrical Power Conductors and Cables.

B. Section 260533.13 - Conduit for Electrical Systems.

C. Section 260533.16 - Boxes for Electrical Systems.

D. Section 262726 - Wiring Devices.

E. Section 262816.16 - Enclosed Switches.

1.03 REFERENCE STANDARDS

A. NEMA WD 1 - General Color Requirements for Wiring Devices; 1999 (Reaffirmed 2020).

B. NEMA WD 6 - Wiring Devices - Dimensional Specifications; 2021.

C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 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 013000 - Administrative Requirements, for submittal procedures.

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

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. Comply with requirements of NFPA 70.

B. Products: Listed, classified, and labeled as suitable for the purpose intended.

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

PART 2 PRODUCTS

2.01 MATERIALS

A. Cords and Caps: NEMA WD 6; match receptacle configuration at outlet provided for equipment.
   1. Colors: Comply with NEMA WD 1.
   2. Size: Suitable for connected load of equipment, length of cord, and rating of branch circuit overcurrent protection.

B. Disconnect Switches: As specified in Section 262816.16 and in individual equipment sections.

C. Wiring Devices: As specified in Section 262726.

D. Flexible Conduit: As specified in Section 260533.13.

E. Wire and Cable: As specified in Section 260519.

F. Boxes: As specified in Section 260533.16.

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.

END OF SECTION

SECTION 26 27 26
WIRING DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Receptacles.

B. Wall plates and covers.

1.02 RELATED REQUIREMENTS

A. Section 260519 - Low-Voltage Electrical Power Conductors and Cables: Manufactured wiring systems for use with access floor boxes with compatible pre-wired connectors.

B. Section 260533.16 - Boxes for Electrical Systems.

C. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

D. Section 260583 - Wiring Connections: Cords and plugs for equipment.

1.03 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.

B. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2016.

C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

D. UL 498 - Attachment Plugs and Receptacles; Current Edition, Including All Revisions.

E. UL 514D - Cover Plates for Flush-Mounted Wiring Devices; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate wiring device ratings and configurations with the electrical requirements of actual equipment to be installed.
   2. Coordinate the installation and preparation of uneven surfaces, such as split face block, to provide suitable surface for installation of wiring devices.
   3. Notify Engineer of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.

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. GFCI Receptacles: Include information on status indicators.

E. Project Record Documents: Record actual installed locations of wiring devices.

1.06 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

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

D. Products: Listed, classified, and labeled as suitable for the purpose intended.

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 PROTECTION

A. Store in a clean, dry space in original manufacturer's packaging until ready for installation.

PART 2 PRODUCTS

2.01 WIRING DEVICES - GENERAL REQUIREMENTS

A. Provide wiring devices suitable for intended use with ratings adequate for load served.

B. Wiring Device Applications:
   1. Receptacles Installed Outdoors or in Damp or Wet Locations: Use weather-resistant GFCI receptacles with weatherproof covers.

2.02 RECEPTACLES

A. 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.

B. GFCI Receptacles:
   1. Weather Resistant GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as weather resistant type complying with UL 498 Supplement SD suitable for installation in damp or wet locations.

2.03 WALL PLATES AND COVERS

A. 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.

B. Weatherproof Receptacle 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.

C. Weatherproof Receptacle 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 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 devices and conductors in accordance with NFPA 70.

C. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

A. 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 260533.16 as required for installation of wiring devices provided under this section.

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. Install wiring devices plumb and level with mounting yoke held rigidly in place.

I. Install vertically mounted receptacles with grounding pole on top and horizontally mounted receptacles with grounding pole on left.

J. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.

K. Identify wiring devices in accordance with Section 260553.

3.04 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

B. Inspect each wiring device for damage and defects.

C. Test each receptacle to verify operation and proper polarity.

D. Test each GFCI receptacle for proper tripping operation according to manufacturer's instructions.

E. Correct wiring deficiencies and replace damaged or defective wiring devices.

3.05 ADJUSTING

A. Adjust devices and wall plates to be flush and level.

3.06 CLEANING

A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

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SECTION 26 28 16.16
ENCLOSED SWITCHES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Enclosed safety switches.

1.02 RELATED REQUIREMENTS

A. Section 260526 - Grounding and Bonding for Electrical Systems.

B. Section 260529 - Hangers and Supports for Electrical Systems.

C. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.

B. NEMA EN 10250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2024.

C. NEMA BS 31047 - Heavy Duty Enclosed and Dead-Front Switches (600 Volts Maximum); 2013 (Reaffirmed 2023).

D. NETA ATS - Standard for Acceptance Testing Specifications for Electrical Power Equipment And Systems; 2025.

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.

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 Engineer of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

A. See Section 013000 - 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.

D. Field Quality Control Test Reports.

E. 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.

F. Project Record Documents: Record actual locations of enclosed switches.

1.06 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

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

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

1.07 DELIVERY, STORAGE, AND HANDLING

A. 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 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. Conductor Terminations: Suitable for use with the conductors to be installed.

G. Provide solidly bonded equipment ground bus in each enclosed safety switch, with a suitable lug for terminating each equipment grounding conductor.

H. Enclosures: Comply with NEMA EN 10250, and list and label as complying with UL 50 and UL 50E.
   1. Environment Type per NEMA EN 10250: Unless otherwise indicated, as specified for the following installation locations:
      a. Outdoor Locations: Type 3R.

I. Provide safety interlock to prevent opening the cover with the switch in the ON position with capability of overriding interlock for testing purposes.

J. Heavy Duty Switches:
   1. Comply with NEMA BS 31047.
   2. Conductor Terminations:
      a. Lug Material: Copper, suitable for terminating copper conductors only.
   3. Provide externally operable handle with means for locking in the OFF position, capable of accepting three padlocks.

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 260529.

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 260526.

H. Identify enclosed switches in accordance with Section 260553.

3.03 FIELD QUALITY CONTROL

A. See Section 014000 - 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.

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SECTION 26 56 00
EXTERIOR LIGHTING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Exterior luminaires.

B. Power Supply

C. Poles and accessories.

1.02 RELATED REQUIREMENTS

A. Section 260526 - Grounding and Bonding for Electrical Systems.

B. Section 260529 - Hangers and Supports for Electrical Systems.

C. Section 260533.16 - Boxes for Electrical Systems.

1.03 REFERENCE STANDARDS

A. IEEE C2 - National Electrical Safety Code(R) (NESC(R)); 2023.

B. IES LM-79 - Approved Method: Optical and Electrical Measurements of Solid-State Lighting Products; 2024.

C. IES LM-80 - Approved Method: Measuring Maintenance of Light Output Characteristics of Solid-State Light Sources; 2021.

D. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.

E. NECA/IESNA 501 - Standard for Installing Exterior Lighting Systems; 2000 (Reaffirmed 2006).

F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

G. UL 1598 - Luminaires; Current Edition, Including All Revisions.

H. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Notify Engineer of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

1.05 SUBMITTALS

A. See Section 013000 - 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.

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, weight, effective projected area (EPA), and installed accessories; include model number nomenclature clearly marked with all proposed features.
   1. LED Luminaires:
      a. Include estimated useful life, calculated based on IES LM-80 test data.
   2. Poles: Include information on maximum supported effective projected area (EPA) and weight for the design wind speed.

D. Certificates for Poles and Accessories: Manufacturer's documentation that products are suitable for the luminaires to be installed and comply with designated structural design criteria.

E. Field Quality Control 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, installation, and starting of product.

G. Project Record Documents: Record actual connections and locations of pole foundations, luminaires, and any pull or junction boxes.

1.06 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

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

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

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, handle, and store products according to NECA/IESNA 501 and manufacturer's written instructions.

B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.

1.08 WARRANTY

A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 LUMINAIRE TYPES

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

2.02 LUMINAIRES

A. Provide products that comply with requirements of NFPA 70.

B. Provide products that are listed and labeled as complying with UL 1598, where applicable.

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

D. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.

E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, poles, foundations, supports, trims, accessories, etc. as necessary for a complete operating system.

F. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.

G. Provide luminaires listed and labeled as suitable for wet locations unless otherwise indicated.

H. LED Luminaires:
   1. Components: UL 8750 recognized or listed as applicable.
   2. Tested in accordance with IES LM-79 and IES LM-80.
   3. LED Estimated Useful Life: Minimum of 50,000 hours at 70 percent lumen maintenance, calculated based on IES LM-80 test data.

2.03 BALLASTS AND DRIVERS

A. Ballasts/Drivers - General Requirements:
   1. Provide ballasts containing no polychlorinated biphenyls (PCBs).

2. Minimum Efficiency/Efficacy: Provide ballasts complying with all current applicable federal and state ballast efficiency/efficacy standards.

2.04 POLES

A. All Poles:
1. Provide poles and associated support components suitable for the luminaire(s) and associated supports and accessories to be installed.
2. Material: Aluminum, unless otherwise indicated.
3. Shape: Square straight, unless otherwise indicated.
4. Finish: Match luminaire finish, unless otherwise indicated.
5. Mounting: Install on concrete foundation, height as indicated on the drawings, unless otherwise indicated.

B. Metal Poles: Provide ground lug, accessible from handhole or transformer base.

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. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

A. Coordinate locations of outlet boxes provided under Section 260533.16 as required for installation of luminaires provided under this section.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Install products in accordance with manufacturer's instructions.

D. Install luminaires in accordance with NECA/IESNA 501.

E. Provide required support and attachment in accordance with Section 260529.

F. Pole-Mounted Luminaires:
1. Maintain the following minimum clearances:
a. Comply with IEEE C2.
b. Comply with utility company requirements.
2. Foundation-Mounted Poles:
a. Install foundations plumb.
b. Install poles plumb, using leveling nuts or shims as required to adjust to plumb.
c. Tighten anchor bolt nuts to manufacturer's recommended torque.
3. Grounding:
a. Bond luminaires, metal accessories, metal poles, and foundation reinforcement to branch circuit equipment grounding conductor.
4. Install separate service conductors, 12 AWG copper, from each luminaire down to handhole for connection to branch circuit conductors.

G. Install accessories furnished with each luminaire.

H. Bond products and metal accessories to branch circuit equipment grounding conductor.

I. Install lamps in each luminaire.

3.04 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

B. Inspect each product for damage and defects.

C. Operate each luminaire after installation and connection to verify proper operation.

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 Engineer. Secure locking fittings in place.

3.06 CLEANING

A. Clean surfaces according to NECA/IESNA 501 and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

3.07 CLOSEOUT ACTIVITIES

A. See Section 017800 - Closeout Submittals, for closeout submittals.

B. Demonstration: Demonstrate proper operation of luminaires to Engineer, and correct deficiencies or make adjustments as directed.

C. Just prior to Substantial Completion, replace all lamps that have failed.

3.08 PROTECTION

A. Protect installed luminaires from subsequent construction operations.

END OF SECTION

SECTION 31 00 00
EARTHWORK

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes the following:
   1. Preparing subgrades for walks, pavements, driveways, lawns, and plantings.
   2. Excavating and backfilling for structures including underground pump station, valve chamber, manhole, and generator building.
   3. Base course for bituminous concrete paving; and bituminous concrete walks and pavements.
   4. Low pressure flowable fill.
   5. Excavating and backfilling trenches for utilities.
   6. Excavating and backfilling test pits.
   7. Disposal of unsuitable material, if required
   8. Disposal of surplus suitable material, if required.
   9. Disconnecting, capping or sealing, and abandoning site utilities in place.

B. Related Sections include the following:
   1. Section 01 57 00 – Temporary Erosion and Sedimentation Control: For protective erosion and sedimentation control measures.
   2. Section 31 10 00 – Site Clearing: For site stripping, grubbing, removing topsoil, and protecting trees to remain.
   3. Section 32 92 00 – Lawn and Grass Restoration: For finish grading of topsoil, placing seed, and restoring surfaces.

1.03 DEFINITIONS

A. Backfill: Soil materials used to fill trench, structure or pit excavations.
   1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe. Also see bedding course.
   2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Base Course: Layer placed under bituminous concrete paving or crushed stone surface course.

C. Bedding Course: Layer placed over the excavated subgrade in a trench before laying pipe, and material placed beside and over pipe in a trench, including haunches, to support sides of pipe.

D. Borrow: Satisfactory soil imported from off-site for use as fill or backfill.

E. Excavation: Removal of material encountered above subgrade elevations.
   1. Additional Excavation: Excavation below subgrade elevations or indicated dimensions as directed by Engineer.
   2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated dimensions without direction by Engineer. Unauthorized excavation, as well as remedial work directed by Engineer, shall be without additional compensation.

F. Fill: Soil materials used to raise existing grades.
   1. Also referred to as Gravel Fill.

G. Rock: Rock material in beds, ledges, unstratified masses, and conglomerate deposits and boulders of rock material exceeding 1 cubic yard.

H. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

I. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, base course, or topsoil materials.

J. Utilities: On-site underground pipes, conduits, ducts, and cables.

1.04 SUBMITTALS

A. Product Data: For the following:
1. Each type of warning tape.
2. Geotextile Fabric
   a. Product Data: Manufacturer's data on each product to be used, including physical properties, seaming materials, and installation instructions.
   b. Samples: Two sheets, 8.5 by 11 inches in size, indicating physical properties.
   c. Manufacturer's Certification: Indicating the proposed geosynthetic function meets design requirements supported by applicable testing results.
   d. Test Reports:
      1. Indicate results of field leakage tests.
      2. Indicate results of field interface friction tests.

B. Material Certificates: From a qualified testing agency indicating compliance of the materials with requirements indicated for the following:
1. Processed aggregate base.
2. Free draining material.
3. Crushed stone.
4. Impervious material.
5. Gravel fill.
6. Flowable Fill.

C. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance with the following with requirements. Prepare separate reports for each type and application of material as well as any onsite material used for bedding or backfill.
1. Gradation in accordance with applicable specification.
2. Laboratory compaction data according to and with applicable specification.
3. Origin of material.

D. Testing Agency: Provide qualifications of an independent geotechnical engineering testing agency that is certified in the State of Connecticut and familiar with DOT geotechnical and pavement testing procedures.

E. For Record Purposes.
1. Dewatering Plan: Identify location and duration of system, and process for removing particulate matter from pumped or drained water, including copies of all required permits. The Contractor shall engage an independent Registered Professional Engineer (in the state where the project is located) with experience in the design of temporary dewatering systems to evaluate his methods for control of water and to design dewatering systems or provide guidance during construction. The design and sequencing of the dewatering systems shall be consistent with the requirements of the temporary earth support system. The Contractor shall submit a notarized letter to the Engineer certifying conformance to the above requirements, before the start of any construction.
2. Excavation Protection System: Proposed system and design data in accordance with OSHA regulations 1926.652.C.
   a. For each excavation 20 feet or deeper, submit an excavation protection system design certified by a professional engineer registered in the State of Connecticut.
   b. Include extend the subsection a above to include the design certified by a professional engineer registered in the State of Connecticut for the support systems.
3. Blasting Video Survey and Report: Performed by an independent professional engineer, sufficiently detailed, of existing conditions of structures, adjoining construction, and site improvements.

a. Format: DVD.
b. Provide audio narration, including location of each site improvement.
c. Perform pre-blasting and post-blasting survey.
d. Submit to Engineer two copies of written report each video.

4. Blasting permit. Submit copy of the permit and pay all the permit fees.
5. Blasting Log. Submit to Owner and Engineer two copies of blasting log. Include the following information:
   a. Location of blasting operation.
   b. Time and date of blasting.
   c. Number of holes.
   d. Amount and type of explosives used per hole.
   e. Names of persons, companies, corporations, or utilities who own, lease or occupy property or structures in proximity to the intended site of explosive use.
   f. Seismograph readings
   g. Peak particle velocities and airblast overpressures resulting from each blast at locations adjacent to nearest structure from blast.

1.05 QUALITY ASSURANCE

A. Form 818: State of Connecticut Department of Transportation Standard Specifications for Roads, Bridges and Incidental Construction.

B. Perform excavation operations in accordance with OSHA Regulations 1926.651 and 1926.652.

C. Perform blasting in accordance with applicable laws, rules, ordinances and regulations governing transportation, storage, handling and use of explosives including OSHA Regulations 1926, Subpart U, and the requirements of State of Connecticut Department of Safety, Division of Fire and Building Safety.
   1. Use a qualified blasting expert licensed by the State of Connecticut with similar experience in rock excavation and controlled blasting techniques.
   2. Familiarize blaster with existing condition video survey.
      Obtain permits and licenses required for blasting operations.

D. Testing Agency: Engage a qualified independent geotechnical engineering testing agency to perform field quality-control compaction testing.
   1. The testing agency must be approved by the Engineer.

E. Site inspections: In the areas where the subgrade consists of peat/organic silt, the Owner’s Geotechnical Engineer shall review the subgrade and provide recommendations.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Identify, store, and handle geosynthetic rolls and samples according to ASTM D4873/D4873M.

B. Protect materials from sunlight and other ultraviolet light sources during storage.

C. Handle geosynthetics with care and prevent dragging, dropping, or imbalanced lifting.

1.07 PROJECT CONDITIONS

A. Existing Utilities: Do not interrupt utilities unless permitted in writing by the utility owner and Engineer and then only after arranging to provide temporary utility services according to requirements indicated:
   1. Notify the utility owner and Engineer not less than two business days in advance of proposed utility interruptions.
   2. Do not proceed with utility interruptions without the utility owner and Engineer's written permission.
   3. Contact “Call–Before-You-Dig” at 1-800-922-4455 two full business days before excavating. Proceed with excavation only after utility completes marking of utility locations.

B. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies to shut off services if lines are active.

C. Abandon on site existing underground utilities indicated to be abandoned. Coordinate with utility companies to shut off services if lines are active.

D. Extent of trench excavation and excavated areas will be controlled by site conditions and Owner's requirements.

E. Place excavated material, backfill and equipment a minimum of 2 feet from edge of excavation. Cast excavated material so as not to interfere with ordinary use of the traveled way.

F. Remove and immediately dispose of unsuitable excavated material.

G. All excavations made within the Town right-of-ways or easements shall be closed and protected during non-work hours. All excavations will be made in compliance with any permit restrictions.

PART 2 - PRODUCTS

2.01 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory native soil materials are not available from excavations.

B. Satisfactory Soils: Free of debris, waste, frozen materials, vegetation, clay and other deleterious matter; adequately graded for satisfactory compaction.
1. On-Site Material: Native soil additionally free of organic matter, roots, and stones larger than 3 inches in any dimension, subject to approval by the Engineer.
2. Borrow Material: Form 818, Section 2.07.02
3. Gravel Fill: Form 818, Section M.02.06, Grading A.
4. Free Draining Material: Form 818, Section M.02.07

C. Backfill and Fill: Satisfactory soil materials.

D. Base: Naturally or artificially graded mixture of natural or crushed gravel, broken or crushed stone, and natural or crushed sand; Form 818, Section M.02.02 and M.02.06, Grading B.
1. Rolled Gravel Base: Form 818, Section M.02.02 and 3
   a. Subbase: Grading B.
   b. Base: Grading C.
2. Processed Aggregate Base: Form 818, Section M.05.01.
3. Crushed Stone: Form 818, Section M.01.01, 3/4-inch clean stone

E. Pervious Structure Backfill: Naturally or artificially graded mixture of natural or crushed gravel, and broken or crushed stone; Form 818, Section M.02.05.

F. Bedding (Pipe, Conduit, and Utilities):
1. Sand: Form 818, Section M.08.03
2. Crushed Stone; washed, narrowly graded mixture of clean broken or crushed ¾ inch stone.
3. Gravel bedding for PVC SDR35 consists of a non-plastic well compacted crushed gravel meeting the following requirements:
   a. 100% passing, 1-1/2 Inch. (40mm) sieve.
   b. < 10% passing, No. 4 (4.75mm) sieve.
   c. < 5% passing, No. 200 No. 200 (0.075mm) sieve.
4. Crushed Stone/Gravel for Driveways shall match in kind as close as possible to the existing material in type and color.

G. Rip Rap Stilling Basin
1. Intermediate Rip Rap shall conform to "Standard Specifications": "Form 818, Standard Specifications for Roads, Bridges and Incidental Construction, State of Connecticut, Department of Transportation" and supplements unless otherwise noted.
2. All rip rap shall be placed to a depth of 24 inches, with final grades as shown on the drawings.

2.02 FLOWABLE FILL

A. Mix: In accordance with the requirements set forth in Form 818, Article M.03.01 General Composition of Concrete Mixes, as well as the applicable sections of ACI 229R.

1. Submit each proposed mix design, with all supporting data to the engineer for review and approval at least two weeks prior to its use.

B. Compressive strength: Between 150 and 200 psi. Tested in accordance with ASTM D4832 after 56 days.

C. Composition: Mixture of Portland cement, aggregate, and water with the option of using fly ash, slag cement, air-entraining agents, and other approved admixtures.

D. Materials utilized in the Low Weight Flowable Fill mix design shall be in accordance with the applicable requirements of Form 818, Article M.03.01.

E. Aggregate: No. 8 aggregate maximum as specified in Form 818, M.01.01.

F. Entrainment Air Content: 20 percent, minimum, when tested in accordance with AASHTO T152.

G. The use of chloride accelerators is not permitted.

2.03 ACCESSORIES

A. Detectable Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, minimum 6 inches wide and 5 mils thick, continuously inscribed with a description of utility, with solid aluminum foil core encased in a protective jacket for corrosion protection.
1. Detectable Underground Utility Marking Tape by Pro-Line Safety Products Company;
2. Detectable Utility Tape by Everett J. Prescott, Inc;
3. Approved equal.

B. Identifying Colors for Utilities:
1. Red: Electric.
2. Yellow: Gas, oil, steam, and dangerous materials.
3. Orange: Telephone and other communications.
4. Blue: Water systems.
5. Green: Sanitary sewer and storm drain systems.

C. Geotextile Fabric for Trenches:
1. Minimum Tensile Strength: 90 pounds.
2. Minimum Elongation: 50 percent.
3. Flow Rate: 150 gpm/sq.ft.
4. Minimum Ultraviolet Resistance: 70 percent at 150 hours.
   a. Petromat 4599 by Amoco Fabrics & Fibers
   b. Terra Tex NO4 by Webtec, Inc.
   c. Approved equal.

D. Lumber: Sound, straight grained spruce or fir, free from shakes, loose knots, and other defects liable to impair its strength or durability. Used shoring may be reused if in good condition.

E. Excavation protection systems: OSHA 1926.652.

PART 3 - EXECUTION

3.01 All materials shall be installed in accordance with applicable ASTM standards and manufacturer's instructions.

3.02 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

B. Protect subgrades and foundation soils against freezing temperatures or frost.

C. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

D. Conduct pre-rock and post-rock removal (Blast) Survey: Whether the Contractor chooses blasting or mechanical means as method of rock excavation, arrange for survey of adjacent structures located within 300 feet of rock removal/ blasting activities, by a qualified independent professional engineer licensed in the State of Connecticut.
   1. Identify and confirm conditions of existing structures before and after blasting operations.

E. Test Pits:
   1. Excavate test pits where directed by the Engineer to determine location of existing utilities and structures.
   2. Backfill test pits immediately after locating and identifying utility or structure.
   3. Excavate and backfill pits with hand tools when existing conditions prevent the use of machinery at no additional cost.

F. Test drill project areas where geotechnical data indicates rock excavation will be expected. Expand limits as necessary to determine the extent of existing rock.
   1. Plot rock elevations on plans/profiles and provide test drilling data to the Engineer prior to beginning sewer pipe installation.

3.03 DEWATERING

A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding or damaging the Project site and surrounding area.
   1. Provide temporary dewatering measures in accordance with “Section 01 57 00 – Erosion and Sedimentation Control” and Sediment and Erosion Control Plan.

B. Protect excavations, backfills, fills and subgrades from softening, undermining, washout, and damage by rain or water accumulation.
   1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches. Provide positive drainage of backfill and fill.
   2. Install a dewatering system to keep subgrades dry and convey ground water away from excavations. Maintain dewatering until structures, pipes and appurtenances will not be damaged by surface or ground water. Maintain until dewatering is no longer required.

C. Remove particulate matter from pumped or drained water.

D. Conform to the requirements that are detailed in the erosion and sedimentation control plans.

3.04 EXPLOSIVES

A. Blasting: When Contractor chooses blasting as method of rock excavation, obtain Blasting Permit from Town Fire Marshal a minimum of two weeks prior to blasting.
   1. Use of explosive is not permitted on weekends, holidays, and eve of holiday.
   2. Advise Engineer a minimum of one working week in advance of dates on which blasting will be performed, and provide approximate hour and duration of blasting.

B. Conduct blasting in accordance with applicable local, state and federal laws and regulations including State of Connecticut Department of Safety, Division of Fire and Building Safety, and OSHA 1926 Subpart U.
   1. Use a qualified blasting expert licensed by the State of Connecticut. Familiarize blaster with existing condition video survey.
   2. Inform property owners and residents within the vicinity of blasting operations.
   3. Conduct baseline sampling of water supply wells prior to beginning blasting activities.
   4. Protect water supply wells from damage or degradation of water quality
   5. Identify and confirm conditions of existing structures before and after blasting operations.

C. Submit to Owner blasting log. Include the following information.
   1. Location of blasting operation.
   2. Time and date of blasting.
   3. Number of holes.
   4. Amount and type of explosives used per hole.

5. Names of persons, companies, corporations, or utilities who own, lease or occupy property or structures in proximity to the intended site of explosive use.
6. Seismograph readings.
7. Peak particle velocities and airblast overpressures resulting from each blast at locations adjacent to nearest structure from blast.

D. Blasting Limit Criteria:
1. Peak Particle Velocity Limits.
a. At existing above grade structures

Distance from Blast to Structure or Watercourse	Maximum Peak Particle Velocity (PPV) (inches per second)
Less than or equal to 100 feet	2.0
100 to 200 feet	1.5
Greater than 200 feet	1.0

2. Airblast Overpressure Limit: 0.014 psi maximum, measured at nearest above ground, occupied structure.

E. Blast Monitoring Equipment: Utilize equipment calibrated within 6 months to a standard traceable to National Bureau of Standards, with instrumentation with the following capabilities.
1. Measure peak particle velocity in three mutually components of velocity in directions: vertical, radial and perpendicular to vibration source.
2. Measure and display maximum peak particle velocity and airblast overpressure immediately after each blast.
3. Provide permanent time history of particle velocity and airblast overpressure waveforms.

F. The contractor shall be responsible for the satisfactory resolution of all water supply issues during construction.
1. Includes supplying temporary water as needed to the affected party at no additional cost.
2. Includes the reestablishment of a permanent water supply of equal or better quality that pre-existed construction activities.

3.05 EXCAVATION, GENERAL

A. Excavate areas as required. In areas where soil support it critical (support for pipe and foundations), utilize a smooth edge bucket to minimize soil disturbance below subgrade.

B. Unclassified Excavation: Excavation to subgrade elevations regardless of the character of surface and subsurface conditions encountered, including soil materials, and obstructions.
1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.
2. Excavate/remove existing in-place utilities as required to complete the work and as depicted on the plans.
3. The contractor shall make every effort to re-utilize the existing site material as backfill material. In the event the materials are acceptable/suitable, but too wet to use immediately, the contractor will temporarily store and handle the material to reduce the moisture content to allow moisture levels to be lowered to facilitate proper compaction and re-use.

C. Remove and dispose of pavement in accordance with Section 31 10 00 – Site Clearing.

D. Rock Excavation: Excavate rock where required to permit construction
1. Rock excavation includes removal of rock, and if necessary, disposal of rock off-site.
a. Rock may be removed via blasting, mechanical means and/or by hand held jack hammers.

2. Do not excavate rock until it has been classified and cross-sectioned by Engineer. Quantity of rock will be based upon measurements taken at time of Engineer's inspection.
3. Observe special precautions where rock is encountered close to water supply wells, buildings or other structures. In extreme cases, due to proximity of properties including homes, water supply wells, water mains, and retaining walls, rock may be required to be removed without the use of explosives at no additional cost.
4. Mechanical Rock Removal Monitoring Equipment: Utilize equipment calibrated within 6 months to a standard traceable to National Bureau of Standards, with instrumentation with the following capabilities"
   a. Measure peak particle velocity in three mutually components of velocity in directions: vertical, radial and perpendicular to vibration source.
   b. Measure and display maximum peak particle velocity.
   c. Provide permanent time history of particle velocity.

3.06 EXCAVATION FOR UTILITY TRENCHES

A. Excavate trenches to indicated gradients, lines, depths, and elevations. Prepare finished bottom of excavation accurately with hand tools.
   1. Trench shoring and bracing located below the narrow limit of trench must be left-in-place.

B. Excavate trenches to uniform widths to provide a working clearance on each side of pipe or conduit and for installation of excavation support systems as required.
   1. Minimum Clearance: As indicated.

C. Trench Bottoms: Excavate trenches deeper than bottom of pipe elevation to allow for bedding course.
   1. Excavate trenches 6 inches deeper than pipe elevation required when in rock or other unyielding bearing material to allow for additional bedding course.

D. When items to be removed fall in areas of trench are excavation for new items the removal item will not be included for payment.

3.07 EXCAVATION FOR STRUCTURES

A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. Extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
   1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work

3.08 APPROVAL OF SUBGRADE

A. Notify Engineer when excavations have reached required subgrade.

B. If Engineer determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.
   1. Additional excavation and replacement material will be paid for according to Contract provisions.
   2. In the areas where the subgrade consists of PEAT/ORG. SILT, the Owner's Geotechnical Engineer review the subgrade and provide recommendations.

C. Proof roll subgrade with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof roll wet or saturated subgrades unless directed by the Engineer.
   1. In trenches utilize rollers/compactors that fit within the trench.

D. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Engineer.

3.09 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavation beneath bottom limits of excavation with gravel fill, sand, stone, bedding material, or lien concrete as approved by Engineer.

3.010 STORAGE OF SOIL MATERIALS

A. Stockpile borrow materials and satisfactory excavated soil materials. Stockpile soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Prevent windblown dust. Provide erosion control measures.
   1. Stockpile soil materials 2 feet minimum away from edge of excavations. Do not store within drip line of remaining trees.
   2. When excavating in or near a road or walk, place excavated material so as not to interfere with ordinary use of traveled way.

3.011 UTILITY TRENCH BACKFILL

A. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Where indicated, install filter fabric around bedding material.

B. Place and compact initial backfill of bedding material, to indicated height over the utility pipe or conduit.
   1. Carefully compact bedding material under pipe haunches and bring backfill evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of utility system.
   2. Pipes 4 Inches and Larger
      a. After joint of pipe is checked by Engineer, fill bedding material to spring line of pipe and tamp backfill. Do not use wooden sticks, shovel handles and similar make-shift devices as tamping tools.
      b. After joint of pipe is checked by Engineer, fill bedding material to 12 inches above top of pipe.
   3. Pipes 2 Inches and Smaller:
      a. Use sand for bedding material. After joint of pipe is checked by Engineer, fill bedding material to 12 inches above top of pipe.
   4. Install layer of filter fabric around bedding material.

C. Place and compact final backfill of satisfactory soil material to final subgrade. Completely embed rocks in soil. Do not place large rocks closer than 18 inches to top of pipe.

D. At structures, place and compact final backfill of satisfactory soil material to final subgrade. Place backfill around all sides of the structures evenly. Completely embed rocks in soil. Do not place large rocks closer than 18 inches to the structure.

E. Remove stones heavier than 100 pounds from material that is otherwise suitable for backfilling. Do not nest stones in backfill.

F. Coordinate backfilling with utility testing.

G. Fill voids with approved backfill materials while shoring and bracing, and as excavation protection systems are removed.

H. In select areas as directed by the Engineer, utilize Free Draining Material as trench backfill.

I. In areas where pipe bouncy is a concern, utilize approved methods to prevent the pipe flotation.

J. Install detectable warning tape directly above utilities along centerline of pipe 18 inches above pipe crown.

3.012 MOISTURE CONTROL

A. If necessary, uniformly moisten or aerate subgrade and each subsequent backfill layer before compaction to within 2 percent of optimum moisture content.
   1. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
   2. Remove and replace, or scarify and air-dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.013 COMPACTION OF BACKFILLS

A. Place backfill and fill materials in layers not more than 12 inches.

B. Place backfill and fill materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.

C. Compact soil to not less than the following percentages of maximum dry unit weight according to ASTM D 1557, Method D:
   1. For utility trench bedding material, compact each layer at 90 percent.
   2. For utility trench final backfill material, compact each layer at 95 percent.
   3. Under structures, steps, and pavements, scarify and re-compact top 12 inches of existing subgrade and each layer of backfill or fill material at 95 percent.
   4. Under roads and walks, compact each layer of backfill or fill material at 95 percent.
   5. Under lawn or unpaved areas, compact each layer of backfill or fill material at 90 percent.

D. For compacting backfill, use equipment specifically designed for compaction purposes.
   1. Hydraulic Vibratory Compactor (Hoe Ram): Use only when specifically approved by the Engineer. Do not use when backfill depth to top of pipe is less than 4 feet.
      a. Compact lifts in 2 to 4 foot lifts in accordance with manufacturer's requirements for specific model and backfill density.

E. For Town Roads: Place and compact backfill and fill materials in conformance with Form 818 Section 2.05.03.

3.014 GRADING

A. General: Uniformly grade areas to a smooth surface, free from irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
   1. Provide a smooth transition between adjacent existing grades and new grades. Provide temporary transitions/ramps to maintain pedestrian and vehicular traffic during construction.
   2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

B. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
   1. Lawn or Unpaved Areas: Plus or minus 1 inch, however, not consistently in one direction.
   2. Walks: Plus or minus 1/2 inch.
   3. Pavements: Plus or minus 1/2 inch.

3.015 TEMPORARY SURFACES

A. Within Town accessways and roadways provide and maintain a smooth graded process aggregate driving surface for traffic during non-working hours and in areas that have been previously disturbed and have not been temporarily paved. Coordinate paving as noted elsewhere in the Specifications. During non-paving seasons continue placement and maintenance of process aggregate surfaces.

3.016 BASE COURSES

A. Under pavements and walks, place base course on prepared subgrade and as follows:
   1. Compact base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 1557, Method D.
      a. Place material to indicated thickness within 3/4 inch, plus or minus.
   2. Shape base to required crown elevations and cross-slope grades.
   3. When thickness of compacted base course is 8 inches or less, place materials in a single layer.

4. When thickness of compacted base course exceeds 8 inches, place materials in equal layers, with no layer more than 8 inches thick or less than 4 inches thick when compacted.
5. Apply additional material after initial spreading and compacting of base course, if Engineer determines additional material is necessary. Shape, wet and compact base course. Correct, or remove and replace areas of segregated coarse or fine material with well-graded material, as directed by the Engineer. Continue compacting and wetting until voids are filled.

3.017 SURFACE COURSES

A. When the bottom course has been completed as specified above, the material shall be spread over it to such thickness that, after final compaction and binding, the total thickness will comply with the details.

B. Compacted surface course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 1557.

C. Any surface or irregularities, which develop during or after work, shall be corrected by loosening material already in place and removing or adding aggregate surrounding surface, shall be re-compacted and rebound until it is brought to a firm and uniform surface satisfactory to the Engineer.

3.018 FIELD QUALITY CONTROL

A. Testing Agency: Contractor will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing.

B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.

C. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable and when directed by the Engineer. Tests will be performed at the following locations and frequencies:
1. Trench Backfill: At each compacted backfill layer, at least one test for each 300 feet or less of trench length per lift, or as directed by the Engineer, but no fewer than two tests.
2. Granular Fill: At least one test for each 500 square feet, but no fewer than two tests.
3. Dune/Beach Sand Fill: At least one test for each 1,000 square feet of each lift.

D. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; re-compact and retest until specified compaction is obtained.

3.019 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
1. Scarify or remove and replace soil material to depth as directed by Engineer; reshape and recompact.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to the greatest extent possible.

3.020 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. The Contractor shall not dispose of soil materials unless there is a project surplus.

B. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off-site.

END OF SECTION

SECTION 31 10 00
SITE CLEARING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes the following:
   1. Protecting existing trees and vegetation to remain.
   2. Videotaping pre-construction conditions.
   3. Removing trees and other vegetation.
   4. Clearing and grubbing.
   5. Topsoil stripping and screening.
   6. Removing, relocating, or resetting of above-grade site improvements including the following:
      a. Fencing.
      b. Signs.
   7. Protective Barrier fence around trees to remain.
   8. Miscellaneous work around utilities.

B. Limits of Work: Minimize disturbance within clearing limits. Perform only as much clearing as required to complete the Work.

C. Related Sections include the following:
   1. Section 01 57 00 – Temporary Erosion and Sedimentation Control: For haybales, silt fences, silt socks, etc.
   2. Section 01 70 00 – Execution and Closeout Requirements: For verifying utility locations and for recording field measurements.
   3. Section 01 78 00 – Closeout Procedures: For verifying utility locations and recording field measurements on record drawings.
   4. Section 31 00 00 – Earthwork: For soil materials, excavating, backfilling, and site grading.
   5. Section 32 92 00 - Lawn and Grass Restoration: For finish grading, including placing and preparing topsoil for lawns and planting.

1.03 DEFINITIONS

A. Clearing Limits: Areas within street right-of-way lines, permanent and temporary easements, and as directed on private property.

B. Site Improvements: Miscellaneous structures and site elements including pavement, curbing, fences, railings, signs, mailboxes, water wells, property line markers, pipes, poles, and wires.

C. Topsoil: Natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches in diameter; and free of weeds, roots, and other deleterious materials.

D. Critical Root Zone (CRZ): Cylindrical area with a diameter 10 times the DBH including the soil within this area to a depth of 3 feet.

E. Diameter at Breast Height (DBH): Diameter of tree to be protected located 4.5 feet above existing finish grade.

1.04 MATERIAL OWNERSHIP

A. Cleared materials not reused on the site shall become Contractor's property and shall be removed from Project site.

1.05 SUBMITTALS

A. Videotape, sufficiently detailed, of existing conditions of trees and plantings, adjoining construction, and site improvements, prior to starting construction.
   1. Format: DVD.
   2. Quantity: Two.
   3. Provide audio narration including location for each site improvement and for overall length of video.
   4. Submit video(s) at time of the preconstruction conference.

B. Surveyor's Notes
   1. Identify and accurately locate survey monuments disturbed due to Contractor's operations.

1.06 QUALITY ASSURANCE

A. Form 818: State of Connecticut Department of Transportation Standard Specifications for Roads, Bridges and Incidental Construction.

1.07 PROJECT CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
   1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
   2. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

B. Protect-In-Place Existing Site Improvements: Support and protect in place existing site occupied or used facilities during site-clearing operations other structures. Restore items promptly; do not leave until end of construction.

C. Remove and Reset Improvements: Carefully remove and protect items to be reset upon completion of construction. Restore damaged items to existing condition or better.
   1. Restore existing property or structures as promptly as practicable. Do not leave restoration until end of construction period.

D. Complete installation of erosion and sedimentation control measures before beginning site clearing.

E. Contact "Call–Before-You-Dig" at 1-800-922-4455 two full business days before excavating. Proceed with excavation only after utility completes marking of utility locations.

F. Equipment Operations
   1. On paved surfaces, do not operate equipment with tracks, treads, or wheels that cut or otherwise damage paved surfaces.
   2. Operate equipment with care to prevent injury to trees and overhanging branches and limbs.

G. Restore surfaces that have been damaged by Contractor's operations to a condition at least equal to condition before work began.

1.08 PROTECTING EXISTING STRUCTURES

A. Support and protect in place existing site improvements designated by the Engineer to be preserved in place. Existing site improvements include pipes, poles, wires, mailboxes, fences, curbing, water wells, property line markers, and other structures.
   1. Restore items damaged by the Contractor, at a minimum, to the condition in which the item was found immediately before beginning the Work. Restore items promptly; do not leave until end of construction.

PART 2 - PRODUCTS

2.01 PROTECTIVE BARRIER FENCE

A. Fabric: High visibility, orange plastic mesh fence
   1. Mesh Opening: 3.25-inch by 1.75-inch.

2. Minimum Roll Width: 4 feet.
3. Temperature Service Range: Minus 40 to plus 200 degrees F.
4. Manufacturer:
   a. National Wire.
   b. Conwed.
   c. Or equal.

B. Wooden Stakes: 1-inch by 2-inch minimum, length as indicated.

PART 3 - EXECUTION

3.01 GENERAL

A. Reuse excavated material wherever possible, unless other material is indicated on the Drawings or specified. Stockpile suitable excavated material in an appropriate location for reuse on an ongoing basis until the project is complete.

3.02 PREPARATION

A. Video the following:
   1. Existing surface conditions of entire project site.
   2. Existing features within the project area including trees, shrubs, fences, hydrants, signs, walls, driveways, poles, drainage structures, foundations, and walks.

B. Protect and maintain benchmarks and survey control points from disturbance during construction.

C. Locate and clearly flag trees and vegetation to be removed or to be relocated.
   1. For tree removal on private properties and Association ROWs, contact the Engineer. The Engineer and Owner will coordinate tree removal on private properties.
      a. Do not proceed with tree removal not identified on the Contract Drawings without Owner and Engineer's notification.
   2. For tree removal on Town right-of-ways, contact the Town Tree Warden in advance of cutting to post notice in accordance with Town requirements.
      a. Provide and post tree removal in accordance with Town requirements.

D. Protect existing site improvements to remain from damage during construction.
   1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.03 TREE AND VEGETATION PROTECTION

A. Erect and maintain a high visibility protective barrier fence around drip line of individual trees or around perimeter drip line of groups of trees to remain, as directed. Remove fence when construction is complete.
   1. Do not store construction materials, debris, or excavated material within drip line of remaining trees.
   2. Do not permit vehicles, equipment, or foot traffic within drip line of remaining trees.

B. Do not excavate within drip line of trees, unless otherwise indicated.

C. Where excavation for new construction is within drip line of trees, protect tree trunks from damage from equipment and construction operations; enclose trunks with wooden boxes of sufficient height.

D. Where excavation for new construction is required within drip line of trees, hand clear and excavate to minimize damage to root systems. Use narrow-tine spading forks, comb soil to expose roots, and cleanly cut roots as close to excavation as possible.
   1. Temporarily support and protect roots from damage until they are permanently relocated and covered with soil.
   2. Coat cut faces of roots more than 1-1/2 inches in diameter with a root promoter.
   3. Backfill with soil as soon as possible.
   4. Aerate soil that has become compacted, over roots of trees to be preserved.

E. Cultivated Hedges, Shrubs, and Plants.

1. Protect-in-place; or temporarily relocate, maintain and replant after construction has been substantially completed, in their original positions.

F. Do not cut branches, limbs or roots except when directed by the Engineer.

G. Repair or replace trees and vegetation to remain that are damaged by construction operations, in a manner approved by Engineer.
   1. Employ a qualified arborist, licensed in the State of Connecticut, to submit details of proposed repairs and to repair damage to trees and shrubs.
   2. Replace trees and shrubs that cannot be repaired and restored to full-growth status, as determined by the qualified arborist.
   3. Replace vegetation with injuries that diminish beauty or affect growth or usefulness, with similar species and quality.

3.04 UTILITIES

A. Locate, identify, disconnect, and seal or cap off utilities indicated to be removed or relocated.

B. Existing Utilities: Do not interrupt utilities unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
   1. Do not proceed with utility interruptions without Utility owner and Engineer's written permission.
   2. Begin coordination with utilities well in advance of any relocation needs.
   3. Notify Utility owner and Engineer not less than two business days in advance of proposed utility interruptions.

3.05 CLEARING AND GRUBBING

A. Remove obstructions, trees, shrubs, grass, and other vegetation to permit installation of new construction. Removal includes digging out stumps and obstructions and grubbing roots. Promptly dispose of material off-site.
   1. Tree Removal on Public Property: Prior to tree removal or trimming, contact the local tree warden or State agency for proper procedure. Apply for necessary permits/ authorization and follow required posting and notification procedures. Do not proceed with removal until authorized by the proper regulatory agency.
   2. Tree Removal on Private Property: Contact property owner. If desired by property owner, cut tree to firewood lengths and stack at on-site location. If not desired by property owner, remove tree in its entirety from the site.
   3. Do not remove trees, shrubs, and other vegetation to remain or to be relocated.
   4. Cut minor roots and branches of trees to remain in a clean and careful manner where such roots and branches obstruct installation of new construction.
   5. Completely remove stumps, roots, obstructions, and debris extending to a depth of 18 inches below exposed subgrade.
   6. Use only hand methods for grubbing within drip line of remaining trees.
   7. Existing Stumps: Treat as specified for other vegetation removed; remove stumps and roots to depth of 18 inches.

B. Cut trees and stumps flush with ground, and clear dead or uprooted trees, brush, roots and debris.

C. Fill depressions caused by clearing and grubbing operations with satisfactory soil material, unless further excavation or earthwork is indicated.
   1. Place fill material in horizontal layers not exceeding 8-inch loose depth, and compact each layer to a density equal to adjacent original ground.

3.06 TOPSOIL STRIPPING

A. Strip topsoil from areas to be disturbed or excavated.

B. Screen topsoil material with a 1-inch screen to remove roots, vegetation, and unsuitable material. Stockpile topsoil materials away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water.

1. Do not stockpile topsoil within drip line of remaining trees.
2. Line stockpile with silt fence or hay bales.
3. Dispose of unsuitable screened material.
4. Stockpile surplus topsoil and allow for respreading deeper topsoil.

3.07 DEMOLITION

1. Demolition materials shall become the Contractor's property.
2. Demolition materials shall be stockpiled with in the limit of disturbance until they are removed for disposal.

3.08 SITE IMPROVEMENTS

A. Remove existing above- and below-grade improvements as indicated and as necessary to facilitate new construction.

B. Remove only as much existing pavement as necessary to perform the Work.
   1. Neatly saw-cut length of existing pavement to remain before removing existing pavement. Saw-cut faces vertically.
   2. Do not mix excavated pavement with other excavated materials unless it is reclaimed and used as part of roadway construction.
      a. Remove and dispose of properly or reclaim pavement from area.
      b. Pavement that is reclaimed shall be stored separately from general backfill and shall not be placed deeper than subgrade.

C. Site Improvements. Remove and reset existing site improvements including fences, dog fencing, sprinkler/irrigation pipe, decorative rocks, signs, and mailboxes that interfere with operations.
   1. Coordinate with Owner prior to work for items on or adjacent to the property in the right of way.
   2. Restore items damaged, at a minimum, to the condition in which the item was found immediately before beginning the Work.
   3. Restore items promptly; do not leave until end of construction.

3.09 DISPOSAL

A. Right of First Refusal
   1. Private Property: Cleared materials including but not limited to trees, excess soil, topsoil, decks, sheds, rock walls, and plantings shall be offered to each property owner.
      a. If the owner does not wish to maintain ownership of the item, cleared materials shall become Contractor's property and shall be removed from the site at no additional cost.
   2. State Property: Cleared materials including but not limited to bituminous concrete pavement and millings, excess soil, topsoil, rock, rock walls, and plantings shall be offered to the State.
      a. If the State does not wish to maintain ownership of the item, cleared materials shall become Contractor's property and shall be removed from the site at no additional cost.
   3. Obtain the State's and each owner's direction a minimum of 2 business days before commencing clearing operations.

B. Removal
   1. Remove trees, unsuitable material, obstructions, demolished materials, and waste materials, including trash and debris, and legally dispose of them off the Site.

3.010 CONTROL SYSTEM

A. Protective Barrier Fence
   1. Install at locations directed by the Engineer.
   2. Drive posts into ground a minimum of 12 inches.
   3. Locate fabric splices at posts only. Provide 6-inch overlap.

END OF SECTION

SECTION 31 50 00
EXCAVATION SUPPORT AND PROTECTION

PART 1 - GENERAL

1.1 Related Documents

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

1.2 Summary

A. Section includes temporary excavation support and protection systems.

B. Related Requirements:
   1. Section 310000 "Earthwork" for excavating and backfilling and for controlling surface-water runoff and ponding.

1.3 Preinstallation Meetings

A. Preinstallation Conference: Conduct conference at Putnam WPCF, 4 Kennedy Drive, Putnam, CT.
   1. Review geotechnical report.
   2. Review existing utilities and subsurface conditions.
   3. Review coordination for interruption, shutoff, capping, and continuation of utility services.
   4. Review proposed excavations.
   5. Review proposed equipment.
   6. Review monitoring of excavation support and protection system.
   7. Review coordination with waterproofing.
   8. Review abandonment or removal of excavation support and protection system.

1.4 Action Submittals

A. Product Data: For each type of product.
   1. Include construction details, material descriptions, performance properties, and dimensions of individual components and profiles, and calculations for excavation support and protection system.

B. Shop Drawings: For excavation support and protection system, prepared by or under the supervision of a qualified professional engineer.
   1. Include plans, elevations, sections, and details.
   2. Show arrangement, locations, and details of soldier piles, piling, lagging, tiebacks, bracing, and other components of excavation support and protection system according to engineering design.
   3. Indicate type and location of waterproofing.
   4. Include a written plan for excavation support and protection, including sequence of construction of support and protection coordinated with progress of excavation.

1.5 Informational Submittals

A. Qualification Data: For professional engineer.

B. Contractor Calculations: For excavation support and protection system. Include analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Existing Conditions: Using photographs, show existing conditions of adjacent construction and site improvements that might be misconstrued as damage caused by inadequate performance of excavation support and protection systems. Submit before Work begins.

D. Record Drawings: Identify locations and depths of capped utilities, abandoned-in-place support and protection systems, and other subsurface structural, electrical, or mechanical conditions.

1.6 Field Conditions

A. Interruption of Existing Utilities: Do not interrupt any utility serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility according to requirements indicated:
   1. Notify **Owner** no fewer than two days in advance of proposed interruption of utility.
   2. Do not proceed with interruption of utility without Owner's written permission.

B. Project-Site Information: A geotechnical report has been prepared for this Project and is available for information only. The opinions expressed in this report are those of a geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by a geotechnical engineer. Owner is not responsible for interpretations or conclusions drawn from the data.
   1. Make additional test borings and conduct other exploratory operations necessary for excavation support and protection according to the performance requirements.
   2. The geotechnical report is referenced elsewhere in Project Manual.

C. Survey Work: Engage a qualified land surveyor or professional engineer to survey adjacent existing buildings, structures, and site improvements; establish exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations.

PART 2 - PRODUCTS

2.1 Performance Requirements

A. Provide, design, monitor, and maintain excavation support and protection system capable of supporting excavation sidewalls and of resisting earth and hydrostatic pressures and superimposed and construction loads.
   1. Contractor Design: Design excavation support and protection system, including comprehensive engineering analysis by a qualified professional engineer.
   2. Prevent surface water from entering excavations by grading, dikes, or other means.
   3. Install excavation support and protection systems without damaging existing buildings, structures, and site improvements adjacent to excavation.

4. Continuously monitor vibrations, settlements, and movements to ensure stability of excavations and constructed slopes and to ensure that damage to permanent structures is prevented.

2.2 Materials

A. General: Provide materials that are either new or in serviceable condition.

B. Structural Steel: ASTM A 36/A 36M, ASTM A 690/A 690M, or ASTM A 992/A 992M.

C. Steel Sheet Piling: ASTM A 328/A 328M, ASTM A 572/A 572M, or ASTM A 690/A 690M; with continuous interlocks.
   1. Corners: Site-fabricated mechanical interlock

D. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.

E. Tiebacks: Steel bars, ASTM A 722/A 722M.

F. Tiebacks: Steel strand, ASTM A 416/A 416M.

PART 3 - EXECUTION

3.1 Preparation

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards that could develop during excavation support and protection system operations.
   1. Shore, support, and protect utilities encountered.

B. Install excavation support and protection systems to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.
   1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

C. Locate excavation support and protection systems clear of permanent construction so that construction and finishing of other work is not impeded.

3.2 Sheet Piling

A. Before starting excavation, install one-piece sheet piling lengths and tightly interlock vertical edges to form a continuous barrier.

B. Accurately place the piling, using templates and guide frames unless otherwise recommended in writing by the sheet piling manufacturer. Limit vertical offset of adjacent sheet piling to 60 inches. Accurately align exposed faces of sheet piling to vary not more than 2 inches from a horizontal line and not more than 1:120 out of vertical alignment.

C. Cut tops of sheet piling to uniform elevation at top of excavation.

3.3 Tiebacks

A. Drill, install, grout, and tension tiebacks.

B. Test load-carrying capacity of each tieback and replace and retest deficient tiebacks.
   1. Have test loading observed by a qualified professional engineer responsible for design of excavation support and protection system.

C. Maintain tiebacks in place until permanent construction is able to withstand lateral earth and hydrostatic pressures.

3.4 Bracing

A. Bracing: Locate bracing to clear columns, floor framing construction, and other permanent work. If necessary to move brace, install new bracing before removing original brace.
   1. Do not place bracing where it will be cast into or included in permanent concrete work unless otherwise approved by Engineer.
   2. Install internal bracing if required to prevent spreading or distortion of braced frames.
   3. Maintain bracing until structural elements are supported by other bracing or until permanent construction is able to withstand lateral earth and hydrostatic pressures.

3.5 Field Quality Control

A. Survey-Work Benchmarks: Resurvey benchmarks regularly during installation of excavation support and protection systems, excavation progress, and for as long as excavation remains open. Maintain an accurate log of surveyed elevations and positions for comparison with original elevations and positions. Promptly notify Engineer if changes in elevations or positions occur or if cracks, sags, or other damage is evident in adjacent construction.

B. Promptly correct detected bulges, breakage, or other evidence of movement to ensure that excavation support and protection system remains stable.

C. Promptly repair damages to adjacent facilities caused by installation or faulty performance of excavation support and protection systems.

3.6 Removal And Repairs

A. Remove excavation support and protection systems when construction has progressed sufficiently to support excavation and earth and hydrostatic pressures. Remove in stages to avoid disturbing underlying soils and rock or damaging structures, pavements, facilities, and utilities.
   1. Remove excavation support and protection systems to a minimum depth of 48 inches below overlying construction and abandon remainder.
   2. Fill voids immediately with approved backfill compacted to density specified in Section 310000 "Earthwork."

3. Repair or replace, as approved by Engineer, adjacent work damaged or displaced by removing excavation support and protection systems.

B. Leave excavation support and protection systems permanently in place.

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SECTION 32 12 16
BITUMINOUS CONCRETE PAVING

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes the following:
   1. Cold reclamation of existing pavement courses and underlying aggregate base course.
   2. Compaction and regrading of resulting base.
   3. Application of calcium chloride to reclaimed base, when base is to be open to vehicular traffic.

B. Related Sections include the following:
   1. 31 00 00 "Earthwork" for full depth aggregate base and subbase courses.

1.02 SUBMITTALS

A. Material Test Reports: Certified by an independent testing laboratory that the following meets specified requirements.
   1. Reclaimed paving material redistributed on the Site.

PART 2 - PRODUCTS

2.01 MIXES

A. Cold-Reclaimed Bituminous Concrete Pavement Base: Blended, homogeneous mix of pulverized existing aggregate base course and bituminous concrete paving material, meeting the following gradation.
   1. Reclaimed Base Gradation:

Sieve Size	Percent Passing
2-1/2 inches	98 - 100
1-1/2 inch	70 to 100

B. Additional Aggregate: Form 816, Article M.02.06, meeting Grading “A” and the requirements for plasticity, resistance to abrasion, and soundness.

C. Trench Backfill: Form 816, Section M.02.05.
   1. When required to raise or lower utilities or underdrains.

D. Liquid Calcium Chloride: ASTM D98 or AASHTO M144; not from reconstituted flake calcium chloride.
   1. Solution
      a. Calcium Chloride 35% +/-1%
      b. Alkali Chloride as NaCl 2% max.
      c. Magnesium as MgCl 0.1%
   2. Typical composition (in lbs. per gallon)
      a. Calcium Chloride 5.05
      b. Sodium Chloride 0.2
      c. Magnesium Chloride 0.004
      d. Calcium Sulfate 0.004
      e. Water 6.002
      Total 11.260

PART 3 - EXECUTION

3.01 PREPARATION

A. Cover structures to prevent reclaimed material, earthwork or reclamation runoff from entering utility structures.

3.02 COLD RECLAMATION

A. Pulverization/Asphalt Reclamation: Pulverize and mix the existing bituminous concrete courses and underlying granular material so as to form a homogenous mass of cold reclaimed asphalt pavement base material which will bond together when compacted.
   1. Width: Entire width of road as designated.
   2. Depth: 8 inches minimum.

B. When proposed grade is lower than the existing grade, reclaim existing bituminous concrete in place and store in windrows or stockpiles while the additional excavation is performed.
   1. After proposed subgrade elevation is achieved and accepted by the Engineer, place reclaimed bituminous concrete material in 5-inch maximum lifts.
   2. Compact reclaimed material in accordance with requirements.

C. Add additional aggregate or base material as required to alter the gradation of the cold-reclaimed asphalt pavement base course or as required to raise the grade line.
   1. Add aggregate during the pulverization process to achieve a thorough mix and blend of material.

D. Equipment. Perform reclamation by means of a self-propelled, traveling rotary reclaimer or equivalent combination pulverizing and compacting machine capable of producing a uniform blend of pavement and base material, and cutting through existing asphalt to depths of up to 12 inches with one pass.
   1. Utilize only equipment specifically designed for this function.
      a. Equipment such as road planers or cold milling machines designed to mill or shred the existing bituminous concrete, rather than crush or fracture it, will not be allowed.

3.03 COMPACTION

A. Shape and grade reclaimed material to indicated lines and grades. Compact material to dense, consolidated mass with a vibratory roller weighing not less than 10 tons.
   1. Compact each lift of cold reclaimed bituminous concrete pavement base in accordance with AASHTO T-180D.
      a. Proctor Wet Density: 95 percent, minimum.

3.04 CALCIUM CHLORIDE

A. Apply a calcium chloride solution to the compacted cold reclaimed bituminous concrete base if the surface is to be opened to vehicular traffic before placement of bituminous concrete pavement.
   1. Roughen the cold reclaimed bituminous concrete base by a grader to provide grooves approximately 2 inches in depth spaced approximately one foot apart, or as approved by the Engineer.
   2. Uniformly distribute a calcium chloride solution over the cold reclaimed bituminous concrete base.

3. Application Rate: 0.4 gallons per square yard, or as determined by the Engineer.

B. Applicator:
   1. Utilize sprayers that accurately measure quantities at any rate between 0.1 to 2.0 gallons per square yard of roadway, at any length of spray bar up to 20 feet.
   2. Include a digital volume and measuring device capable of measuring gallons applied and distance traveled.
   3. Equip a power unit for pressurized application. Do not apply by gravity method.
   4. The spray nozzles and pressure system shall provide a sufficient and uniform fan-shaped spray of solution throughout the entire length of the spray bar at all times while operating, and shall be adjustable laterally and vertically.

C. Maintain a uniform rate of distribution of solution regardless of change in grade, width or direction.

D. Complete application in continuous segments.
   1. Each segment must be reclaimed, compacted, stabilized by calcium chloride and compacted again before it is opened to vehicular traffic.

E. Do not apply calcium chloride solution when it is raining or when rain is forecast within one hour of placement.

3.05 INSTALLATION TOLERANCES

A. Thickness: Compact material to produce the thickness indicated within the following tolerances:
   1. Base Course: Plus or minus 1/4 inch.

3.06 FIELD QUALITY CONTROL

A. Repulverize, reshape, recompact and manipulate reclaimed material to within the indicated tolerances.

3.07 DISPOSAL

A. Dispose of surplus materials from Project site.
   1. Do not allow surplus materials to accumulate on-site.

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SECTION 32 92 00
LAWN AND GRASS RENOVATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes the following:
   1. Providing and grading topsoil.
   2. Seeding, or hydroseeding.
   3. Lawn and grass renovation.

B. Related Sections include the following:
   1. Section 31 00 00 – Earthwork:
   2. Section 31 10 00 – Site Clearing

C. Restoration of existing lawn and grass areas, and topsoiling and seeding of areas designated on the Drawings, will not be measured separately

D. Work associated with restoration of existing lawn and grass areas, and topsoiling and seeding of areas designated on the Drawings, will not be paid for separately but shall be included in the respective payment item.

1.03 DEFINITIONS

A. Finish Grade: Elevation of finished surface of topsoil.

B. Lawn: Established turf or grass area to be reseeded, or newly graded area to be seeded.

C. Subgrade: Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill immediately beneath topsoil.

D. Topsoil Mix: Native or imported topsoil, or surface soil modified to become topsoil; mixed with soil amendments.

1.04 SUBMITTALS

A. Certification of Grass Seed: From seed vendor for each grass-seed monostand or mixture stating the botanical and common name and percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.

B. Product Certificates: For soil amendments, fertilizers, and mulch, signed by product manufacturer.

C. Qualification Data: For landscape Installer.

D. Material Test Reports: For existing surface soil and imported topsoil.

E. Planting Schedule: Indicating anticipated planting dates for each type of planting.

F. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of lawns during a calendar year. Submit before expiration of required maintenance periods.

G. Submit certificate of compliance with specification for topsoil, fertilizer, and seed.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful lawn establishment.
   1. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when planting is in progress.

B. Soil-Testing Laboratory Qualifications: An independent laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.

C. Topsoil Analysis: Furnish soil analysis by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; deleterious material; pH; and mineral and plant-nutrient content of topsoil.
   1. Report suitability of topsoil for lawn growth. State recommended quantities of nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce a satisfactory topsoil.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Seed, Lime, and Fertilizer: Deliver in original sealed, labeled, and undamaged containers.

1.07 SCHEDULING

A. Planting Restrictions: Plant during one of the following periods.
   1. Spring Planting: March 15 to June 30.
   2. Fall Planting: August 15 to October 30.

B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit.

1.08 LAWN MAINTENANCE

A. Begin maintenance immediately after each area is planted and continue until satisfactory lawn is established, but for not less than the following periods:
   1. Seeded Lawns: 60 days from date of Substantial Completion.
      a. When full maintenance period has not elapsed before end of planting season, or if lawn is not fully established, continue maintenance during next planting season.

B. Maintain and establish lawn by watering, fertilizing, weeding, mowing, trimming, replanting, and other operations. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth lawn.
   1. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch. Anchor as required to prevent displacement.

C. Watering: Keep lawn uniformly moist to a depth of 4 inches.
   1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Prevent walking over muddy or newly planted areas.
   2. Water lawn at a minimum rate of 1 inch per week.

D. Mow lawn as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than 40 percent of grass height. Remove no more than 40 percent of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain grass height of 2 to 3 inches.

E. Lawn Postfertilization: Apply fertilizer after initial mowing and when grass is dry.
   1. Use fertilizer that will provide actual nitrogen of at least 1 lb/1000 sq. ft. to lawn area.

PART 2 - PRODUCTS

2.01 SEED

A. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Journal of Seed Technology; Rules for Testing Seeds" for purity and germination tolerances.

B. Seed Mixture:

	Proportion by Weight (Percent)	Minimum Purity (Percent)	Minimum Germination (Percent)
Kentucky Bluegrass	30	95	75
Creeping Red Fescue	20	98	85
K.31 Tall Fescue	40	98	85
Perennial Ryegrass	10	98	90

2.02 TOPSOIL

A. Topsoil: ASTM D 5268, pH range of 5.5 to 7, a minimum of 6 percent and a maximum of 20 percent organic material content; free of stones 1 inch or larger in any dimension and other extraneous materials harmful to plant growth.
   1. Topsoil Source: Reuse surface soil stockpiled on-site. Verify suitability of stockpiled surface soil to produce topsoil. Clean surface soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.
      a. Supplement with imported topsoil from off-site sources when quantities are insufficient. Obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 4 inches deep; do not obtain from agricultural land, bogs or marshes.
   2. Topsoil Source: Import topsoil from off-site sources. Obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 4 inches deep; do not obtain from agricultural land,] bogs or marshes.

2.03 INORGANIC SOIL AMENDMENTS

A. Lime: ASTM C 602, agricultural limestone containing a minimum 80 percent calcium carbonate equivalent and as follows:
   1. Provide lime in form of dolomitic limestone, Class S, with a minimum of 95 percent passing a No. 100 sieve.

B. Perlite: Horticultural perlite, soil amendment grade.

C. Sand: Clean, washed, natural or manufactured, free of toxic materials

2.04 FERTILIZER

A. Bonemeal: Commercial, raw or steamed, finely ground; a minimum of 1 percent nitrogen and 18 percent phosphoric acid.

B. Superphosphate: Commercial, phosphate mixture, soluble; a minimum of 20 percent available phosphoric acid.

C. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:
   1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing agency.

2.05 MULCHES

A. Straw Mulch: Provide air-dry, clean, mildew- and seed-free, hay or threshed straw of wheat, rye, oats, or barley; free of weeds, reeds, and twigs; maximum moisture content of 15 percent. Do not use salt hay.

B. Nonasphaltic Tackifier: Colloidal tackifier recommended by fiber-mulch manufacturer for slurry application; nontoxic and free of plant-growth or germination inhibitors.

2.06 EROSION-CONTROL MATERIALS

A. Erosion-Control Blankets: Biodegradable wood excelsior, straw, or coconut-fiber mat enclosed in a photodegradable plastic mesh. Include manufacturer's recommended steel wire staples, 6 inches long.

2.07 TOPSOIL MIX

A. Topsoil Mix: Mix topsoil with soil amendments and fertilizers in quantities required by the topsoil test report.
   1. Thoroughly blend stockpiled soil with soil amendments before spreading.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine areas to receive lawns and grass for compliance with requirements and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.
   1. Protect adjacent and adjoining areas from hydroseeding overspray.

B. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.03 LAWN PREPARATION

A. Limit lawn subgrade preparation to areas to be restored or newly planted.

B. Newly Graded Subgrades: Loosen subgrade to a minimum depth of 6 inches. Remove stones larger than 1 inch in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
   1. Spread topsoil to a depth of 6 inches but not less than required to meet finish grades after light rolling and natural settlement. Do not spread if topsoil or subgrade is frozen, muddy, or excessively wet.

C. Unchanged Subgrades: If lawns are to be planted in areas unaltered or undisturbed by excavating, grading, or surface soil stripping operations, prepare surface soil in accordance with Article “Lawn Renovation”.

D. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit fine grading to areas that can be planted in the immediate future.

E. Moisten prepared lawn areas before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

F. Restore areas if eroded or otherwise disturbed after finish grading and before planting.

3.04 SEEDING

A. Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.
   1. Do not use wet seed or seed that is moldy or otherwise damaged.

B. Sow seed at the rate of 4 lb/1000 sq. ft.

C. Rake seed lightly into top 1/8 inch of topsoil, roll lightly, and water with fine spray.

D. Protect seeded areas with slopes exceeding 1:2.5 with erosion-control blankets installed and stapled according to manufacturer's written instructions.

E. Protect seeded areas with slopes not exceeding 1:3 by spreading straw mulch. Spread uniformly at a minimum rate of 2 tons/acre to form a continuous blanket 1-1/2 inches in loose depth over seeded areas. Spread by hand, blower, or other suitable equipment.
   1. Bond straw mulch by spraying with asphalt emulsion at the rate of 10 to 13 gal./1000 sq. ft. Take precautions to prevent damage or staining of structures or other plantings adjacent to mulched areas. Immediately clean damaged or stained areas.

3.05 HYDROSEEDING

A. Hydroseeding: Mix specified seed, fertilizer, and fiber mulch in water, using equipment specifically designed for hydroseed application. Continue mixing until uniformly blended into homogeneous slurry suitable for hydraulic application.
   1. Mix slurry with non asphaltic tackifier.
   2. Apply slurry uniformly to all areas to be seeded in a one-step process. Apply mulch at a minimum rate of 1500-lb/acre dry weight but not less than the rate required to obtain specified seed-sowing rate.

3.06 LAWN RENOVATION

A. Renovate existing lawn.

B. Renovate existing lawn damaged by Contractor's operations, such as storage of materials or equipment and movement of vehicles.
   1. Reestablish lawn where settlement or washouts occur or where minor regrading is required.

C. Remove sod and vegetation from diseased or unsatisfactory lawn areas; do not bury in soil.

D. Remove topsoil containing foreign materials resulting from Contractor's operations, including oil drippings, fuel spills, stone, gravel, and other construction materials, and replace with new topsoil.

E. Mow, dethatch, and rake existing lawn.

F. Remove weeds before seeding.

G. Remove stones larger than 1 inch in any dimension. Remove waste and foreign materials, including sticks, roots, trash, and other extraneous matter, and legally dispose of them off Owner's property.

H. Till stripped, bare, and compacted areas thoroughly to a soil depth of 6 inches.

I. Apply soil amendments and initial fertilizers required for establishing new lawns and mix thoroughly into top 4 inches of existing soil. Provide new topsoil to fill low spots and meet finish grades.

J. Remove waste and foreign materials, including weeds, grass, vegetation, and turf, and legally dispose of them off Owner's property.

K. Apply seed and protect with straw mulch as required for new lawns.

L. Water newly planted areas and keep moist until new lawn is established.

3.07 SATISFACTORY LAWNS

A. Satisfactory Seeded Lawn: A healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. and bare spots not exceeding 3 by 3 inches.

B. Reestablish lawns that do not comply with requirements and continue maintenance until lawns are satisfactory.

3.08 CLEANUP AND PROTECTION

A. Promptly remove soil and debris created by lawn work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

B. Erect barricades and warning signs as required to protect newly planted areas from traffic. Maintain barricades throughout maintenance period and remove after lawn is established.

C. Remove erosion-control measures after grass establishment period.

END OF SECTION

SECTION 33 11 00
WATER UTILITY DISTRIBUTION PIPING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes water-distribution piping and related components outside the building for water service.

B. Utility-furnished products include water meters that will be furnished to the site, ready for installation.

1.03 DEFINITIONS

A. Water Service: Exterior domestic-water piping.

B. DI: Ductile Iron.

1.04 SUBMITTALS

A. Product Data: For each type of product indicated.
   1. Piping Specialties.
   2. Valves and accessories.

B. Field quality-control test reports.

C. Operation and Maintenance Data: For water valves and specialties to include in emergency, operation, and maintenance manuals.

1.05 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. Comply with requirements of utility company supplying water. Include tapping of water mains and backflow prevention.
   2. Comply with standards of authorities having jurisdiction for potable-water-service piping, including materials, installation, testing, and disinfection.
   3. Comply with standards of authorities having jurisdiction for fire-suppression water-service piping, including materials, hose threads, installation, and testing.

B. Piping materials shall bear label, stamp, or other markings of specified testing agency.

C. NFPA Compliance: Comply with NFPA 24 for materials, installations, tests, flushing, and valve and hydrant supervision for fire-service-main piping for fire suppression.

D. NSF Compliance:
   1. Comply with NSF 61 for materials for water-service piping and specialties for domestic water.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Preparation for Transport: Prepare valves, including fire hydrants, according to the following:

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1. Ensure that valves are dry and internally protected against rust and corrosion.
2. Protect valves against damage to threaded ends and flange faces.
3. Set valves in best position for handling. Set valves closed to prevent rattling.

B. During Storage: Use precautions for valves, including fire hydrants, according to the following:
1. Do not remove end protectors unless necessary for inspection; then reinstall for storage.
2. Protect from weather. Store indoors and maintain temperature higher than ambient dew-point temperature. Support off the ground or pavement in watertight enclosures when outdoor storage is necessary.

C. Handling: Use sling to handle valves and fire hydrants if size requires handling by crane or lift. Rig valves to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.

D. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.

E. Protect stored piping from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.

F. Protect flanges, fittings, and specialties from moisture and dirt.

G. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

1.07 PROJECT CONDITIONS

A. Interruption of Existing Water-Distribution Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water-distribution service according to requirements indicated:
1. Notify Engineer and Owner no fewer than one week in advance of proposed interruption of service.
2. Do not proceed with interruption of water-distribution service without Owner's and Engineers written permission.

1.08 COORDINATION

A. Coordinate connection to water main with utility company.

PART 2 - PRODUCTS

2.01 DUCTILE-IRON PIPE AND FITTINGS

A. Mechanical-Joint, Ductile-Iron Pipe: AWWA C151, Class 53 with mechanical-joint bell and plain spigot end unless grooved or flanged ends are indicated.
1. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
2. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

B. Push-on-Joint, Ductile-Iron Pipe: AWWA C151, with push-on-joint bell and plain spigot end unless grooved or flanged ends are indicated.
   1. Push-on-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
   2. Gaskets: AWWA C111, rubber.

C. Flanges: ASME 16.1, Class 125, cast iron.

2.02 JOINING MATERIALS

A. Transition Couplings:
   1. Underground Piping, NPS 2 and Larger: AWWA C219, metal, sleeve-type coupling same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.

2.03 GATE VALVES

A. AWWA, Cast-Iron Gate Valves:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. McWane, Inc.; Clow Valve Co. Div. (Oskaloosa).
      b. McWane, Inc.; Kennedy Valve Div.
      c. Or approved equal.
   2. Nonrising-Stem, Resilient-Seated Gate Valves:
      a. Description: Gray- or ductile-iron body and bonnet; with bronze or gray- or ductile-iron gate, resilient seats, bronze stem, and stem nut.
         1) Standard: AWWA C509.
         2) Minimum Pressure Rating: 200 psig.
         3) End Connections: Mechanical joint.
         4) Interior Coating: Complying with AWWA C550.

2.04 GATE VALVE ACCESSORIES AND SPECIALTIES

A. Valve Boxes: Comply with AWWA M44 for cast-iron valve boxes. Include top section, adjustable extension of length required for depth of burial of valve, plug with lettering "WATER," and bottom section with base that fits over valve and with a barrel approximately 5 inches in diameter.
   1. Operating Wrenches: Steel, tee-handle with one pointed end, stem of length to operate deepest buried valve, and socket matching valve operating nut.
      a. One wrench per valve.

B. Indicator Posts: UL 789, FMG-approved, vertical-type, cast-iron body with operating wrench, extension rod, and adjustable cast-iron barrel of length required for depth of burial of valve.

2.05 FIRE HYDRANTS

A. Dry-Barrel Fire Hydrants:
   1. Description: Freestanding, with one NPS 4-1/2 and two NPS 2-1/2 outlets, 5-1/4-inch main valve, drain valve, and NPS 6 mechanical-joint inlet. Include interior coating

according to AWWA C550. Hydrant shall have cast-iron body, compression-type valve opening against pressure and closing with pressure.

a. Standard: AWWA C502.
b. Pressure Rating: 150 psig minimum.
c. Outlet Threads:
    1) NPS 4-1/2 inch Norwich steamer
    2) NPS 2-1/2 inch ANSI B26
d. Hydrant Finish:
    1) Shop primer: Two coats; second coat red
    2) Field: Two finish coats
e. Manufacturers & Model:
    1) Model B-62-B by American Darling
    2) Model A-423 by Muller Company
f. Direction of Opening: Open hydrant valve by turning operating nut to left or counterclockwise.

PART 3 - EXECUTION

3.01 EARTHWORK

A. Refer to Division 2 Section "Earthwork" for excavating, trenching, and backfilling.

3.02 PIPING APPLICATIONS

A. General: Use pipe, fittings, and joining methods for piping systems according to the following applications.

B. Transition couplings and special fittings with pressure ratings at least equal to piping pressure rating may be used, unless otherwise indicated.

C. Do not use flanges or unions for underground piping.

3.03 VALVE APPLICATIONS

A. General Application: Use mechanical-joint-end valves for NPS 3 and larger underground installation. Use threaded- or flanged-end valves for installation in vaults. Use corporation valves and curb valves with ends compatible with piping, for NPS 2 and smaller installation.

B. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
    1. Underground Valves, NPS 3 and Larger: AWWA, cast-iron, nonrising-stem, resilient-seated gate valves with valve box.
    2. Pressure-Reducing Valves: Use for water-service piping in vaults and aboveground to control water pressure.

3.04 PIPING INSTALLATION

A. Install ductile-iron piping according to AWWA C600 and AWWA M41.

B. Bury piping with depth of cover indicated:

C. Sleeves are specified in Division 15 Section "Sleeves and Sleeve Seals for Plumbing Piping."

D. Mechanical sleeve seals are specified in Division 15 Section "Sleeves and Sleeve Seals for Plumbing Piping."

E. Install underground piping with restrained joints at horizontal and vertical changes in direction. Use restrained-joint piping, anchors, tie-rods and clamps, and other supports.

F. See Division 15 Section "Domestic Water Piping" for potable-water piping inside the building.

3.05 JOINT CONSTRUCTION

A. Make pipe joints according to the following:
   1. Ductile-Iron Piping, Gasketed Joints for Water-Service Piping: AWWA C600 and AWWA M41.
   2. Ductile-Iron Piping, Gasketed Joints for Fire-Service-Main Piping: UL 194.

3.06 ANCHORAGE INSTALLATION

A. Anchorage, General: Install water-distribution piping with restrained joints. Anchorages and restrained-join.

B. Install anchorages for tees, plugs and caps, bends, crosses, valves, and hydrant branches. Include anchorages for the following piping systems:
   1. Gasketed-Joint, Ductile-Iron Piping: According to AWWA C600.

C. Apply full coat of asphalt or other acceptable corrosion-resistant material to surfaces of installed ferrous anchorage devices.

3.07 VALVE INSTALLATION

A. AWWA Gate Valves: Comply with AWWA C600 and AWWA M44. Install each underground valve with stem pointing up and with valve box.

B. AWWA Valves Other Than Gate Valves: Comply with AWWA C600 and AWWA M44.

3.08 WATER METER INSTALLATION

A. Install water meters, piping, and specialties according to utility company's written instructions.

B. Water Meters: Install dual turbine-type water meters NPS 3 and larger in meter vaults. Include shutoff valves on water meter inlets and outlets, and include valved bypass around meters. Support meters, valves, and piping on brick or concrete piers.

C. Support water meters and piping NPS 3 and larger on concrete piers. Comply with requirements for concrete piers in Division 3 Section "Cast-in-Place Concrete."

3.09 FIRE HYDRANT INSTALLATION

A. General: Install each fire hydrant with separate gate valve in supply pipe, anchor with restrained joints or thrust blocks, and support in upright position.

B. AWWA Fire Hydrant: Comply with AWWA M17.

3.010 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect water-distribution piping to existing water main. Use tapping sleeve and tapping valve.

C. Connect water-distribution piping to interior domestic water piping.

D. Ground equipment according to Division 16 Section "Grounding and Bonding."

E. Connect wiring according to Division 16 Section "Conductors and Cables."

3.011 FIELD QUALITY CONTROL

A. Piping Tests: Conduct piping tests before joints are covered and after concrete thrust blocks have hardened sufficiently. Fill pipeline 24 hours before testing and apply test pressure to stabilize system. Use only potable water.

B. Hydrostatic Tests: Test at not less than one-and-one-half times working pressure for two hours.
   1. Increase pressure in 50-psig increments and inspect each joint between increments. Hold at test pressure for 1 hour; decrease to 0 psig. Slowly increase again to test pressure and hold for 1 more hour. Maximum allowable leakage is 2 quarts per hour per 100 joints. Remake leaking joints with new materials and repeat test until leakage is within allowed limits.

C. Prepare reports of testing activities.

3.012 IDENTIFICATION

A. Install continuous underground warning tape during backfilling of trench for underground water-distribution piping. Locate below finished grade, directly over piping. Underground warning tapes are specified in Division 2 Section "Earthwork."

3.013 CLEANING

A. Clean and disinfect water-distribution piping as follows:
   1. Purge new water-distribution piping systems and parts of existing systems that have been altered, extended, or repaired before use.
   2. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in AWWA C651 or do as follows:
      a. Fill system or part of system with water/chlorine solution containing at least 50 ppm of chlorine; isolate and allow to stand for 24 hours.
      b. Drain system or part of system of previous solution and refill with water/chlorine solution containing at least 200 ppm of chlorine; isolate and allow to stand for 3 hours.
      c. After standing time, flush system with clean, potable water until no chlorine remains in water coming from system.
      d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedure if biological examination shows evidence of contamination.

B. Prepare reports of purging and disinfecting activities.

END OF SECTION

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SECTION 33 30 00
SANITARY SEWERAGE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes the following:
   1. Sanitary sewer piping and appurtenances for gravity and force main piping.
   2. Sanitary sewer manholes.
   3. Connections to existing and future sanitary facilities.

B. Related Sections include the following:
   1. Section 31 00 00 – Earthwork: For low pressure flowable fill, trenching, and backfill.

1.03 DEFINITIONS

A. PVC: Polyvinyl chloride plastic.

1.04 PERFORMANCE REQUIREMENTS

A. Gravity-Flow, Non-Pressure-Piping and Manhole Pressure Ratings: At least equal to system test pressure.

B. Pressure pipe shall be at least equal to the 1.25 times system operating pressure provided it does not exceed the marked pressure capacity of the pipe/accessories being tested.

1.05 SUBMITTALS

A. Product Certification: Pipe, valves, fittings, precast concrete units, metal items, and miscellaneous appurtenances.

B. Product Data: For the following:
   1. Submit manufacturer's catalog cuts, specifications and installation instructions, for pipe and coupling systems.
      a. Piping QC/QA inspections and testing recommendations from the manufacturer.
   2. Pipe, valves, and fittings.
      a. Precast concrete units.
      b. Metal items.

C. Shop Drawings: Include plans, elevations, details, and attachments for the following:
   1. Precast concrete manholes, including frames and covers.
   2. Buoyancy computations (with sketch) demonstrating the structure/manhole will not float utilizing a water elevation taken to be the same as the existing ground.

D. Design Mix Reports and Calculations: For each class of cast-in-place concrete.

E. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

F. Record Drawings: In accordance with Section 017800.

1.06 QUALITY ASSURANCE

A. Sewer and Water Line Separation. Perform work in accordance with New England Interstate Water Pollution Control Commission (NEIWPCC) Technical Report Number 16, and the following.
   1. Horizontal Separation from Water Mains: 10 feet minimum.
      a. If existing conditions prevent 10-foot horizontal separation, install sewer in separate trench with top (crown) of sewer 18 inches below the bottom (invert) of existing water main.

2. Vertical Separation at Crossing of Sewer and Water Main. Install top of sewer 18 inches below bottom of water main. Locate sewer joints equidistant from water main joints and install sewer joints at a maximum distance from water main joints.
   a. If existing conditions prevent minimum vertical separation, either maximize vertical separation and encase sewer in flowable fill, or reconstruct water main with mechanical joint pipe for 10 feet beyond crossing. Coordinate any relocation of water main or services with Connecticut Water Company prior to, and during work.
   b. Center one full-length of water main piping over sewer.
   c. Where a water main crosses under a sewer, provide adequate structural support for sewer to maintain line and grade.
   d. When horizontal or vertical separation cannot be achieved, construct watertight, structurally-sound sewer system and water main of mechanical-joint cement-lined ductile iron pipe or approved equal.
   e. Pressure test each line.
      1) Water
         a) Test to pressure rating of pipe.
      2) Sewer
         a) Refer to section 3.8 Field Quality Control for low pressure air testing.

B. All pre-molded gasket joint polyvinyl chloride pipe of a particular manufacturer may be rejected if there are more than five unsatisfactory joint assembly operations or "belt breaks" in 100 consecutive joints, even though the pipe and joint conform to the appropriate ASTM specifications as specified. If the pipe is unsatisfactory as determined above, the Contractor shall, if required, remove all pipe of that manufacturer of the same shipment from the work and shall furnish pipe from another manufacturer which will conform to all of the requirements of these specifications.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Arrange delivery schedules to minimize handling at the Project site.

B. Deliver, handle and store equipment/materials/parts in manufacturer’s original, undamaged shipping containers with tags and labels intact and legible.

C. Store off ground, undercover, protected from weather and construction activities.

D. Handle and store per manufacturer’s requirements.

E. Contractor is responsible for coordinating with equipment manufacturer for delivery, field service and startup.
   1) Contractor is responsible for providing water for hydrostatic testing.

F. Do not store PVC structures, pipe, and fittings in direct sunlight. Keep PVC items at ambient outdoor temperature.

G. Protect pipe, pipe fittings, and seals from dirt and damage.

H. Handle precast concrete manholes and other structures according to manufacturer's written rigging instructions.

I. Inspection: Upon delivery of pipe, assist Engineer in inspecting pipe.
   1. Straightness Tolerance: Maximum deviation of 1/16 inch per foot from straight line drawn between center of openings.
   2. Immediately remove lengths of pipe that fail straightness requirement.

J. Rejection of Manufacturer and Product: Remove all pipe supplied by a manufacturer if more than five percent of shipment is rejected. Handle precast concrete manholes and other structures according to manufacturer's written rigging instructions.

1.08 PROJECT CONDITIONS

A. Coordinate installation of gravity sewers in street right-of-way or easements with existing utilities.

B. Prepare Record Project Documents as defined elsewhere.

PART 2 - PRODUCTS

2.01 SDR35 GRAVITY SEWER PIPE

A. PVC Sewer Pipe and Fittings, NPS 15 and Smaller: ASTM D 3034, SDR 35, for gasketed joints.

B. Gaskets: ASTM D 3212, elastomeric seals; resistant to common sewage and industrial wastes including oil and groundwater.

C. PVC Pipes shall be push-on bell and spigot joints. Straight pipe will be furnished in lengths not more than 13 feet, unless otherwise indicated on the plans.

2.02 DUCTILE IRON FORCE MAIN PIPE

A. Pipe shall be thickness Class 52, for push-on joint that conform to AWWA C110/A21.10 - Ductile-Iron and Gray-Iron Fittings 2021.

B. Uninsulated pipe shall be wrapped in polyethylene encasement.

C. Pipe shall have an asphaltic outside coating is in accordance with ANSI/AWWA C151/A21.51.

D. Gaskets are furnished in accordance with ANSI/AWWA C111/A21.11
   1. Material shall be SBR — styrene butadiene rubber.

E. Exterior Coating: Standard bituminous coating of either coal tar or asphalt base, 1 mil thick minimum.

F. Inside Lining: ANSI/AWWA C104/A21.4, cement mortar with double lining.

G. Encasement for Ductile Iron Pipe System shall comply with ANSI/AWWA C105/A21.5 for proper external protection procedures.

2.03 GATE VALVE

A. Isolation Gate Valve
   1. AWWA C515, resilient wedge, ductile iron valve fully-encapsulated in synthetic rubber.
   2. Working Pressure: 200 psi.
   3. Mechanical Joint Ends: ANSI/AWWA C111/A21.11.
   4. Opening: Wrench-operated; left-turn open (LTO).
   5. Key: Provide one tee-handle key for each gate valve size.
   6. Operating Wrenches: Steel, tee-handle with one pointed end, stem of length to operate deepest buried valve, and socket matching valve operating nut.
      a. Provide one tee-handle key for each gate valve size.
      b. Provide malleable-iron handwheel when valve is located in structure.
      c. Provide three (3) pentagon hand key to open valve cover.
   7. Approved Manufacturers:
      a. Clow
      b. Waterous
      c. Or approved equal.

B. Valve Box:
   1. Cast iron base, slide-type extension sections, and adjustable slide-type top section designed for 5 feet of cover above top of pipe.
      a. Cover: Cast iron, drop type, with “SEWER” cast on top.

2.04 PRECAST CONCRETE STRUCTURES

A. Precast Concrete Manholes: ASTM C 478, precast, reinforced concrete, of depth indicated, with provision for rubber gasketed joints.
   1. Manholes will be constructed of precast concrete sections.
   2. Manhole joints will be reduced friction seal pre-lubricated profile gaskets utilizing a single off-set and the structures will be subject to vacuum testing to 13 pounds per square inch (psi) for leak detection prior to being commissioned.

3. The straight alignment hydrostatic test requires no leakage for 10 minutes at an internal pressure of 13 psi (30 ft.)
4. Base: Monolithic combination base and riser section. Increase thickness of precast concrete sections or add concrete to base section, as required to prevent flotation. Fabricate pipe openings and sleeves to accommodate outside diameter of pipe to be connected.
5. Riser Sections: Lengths to provide depth indicated.
6. Top Section: Eccentric-cone type, unless concentric-cone or flat-slab-top type is indicated. Top of cone of size that matches diameter of grade rings.
7. Resilient Connectors: ASTM C923
8. Gasket:
    a. A rubber gasket shall be employed in the connection of the sanitary manhole to ensure a watertight connection.
    b. The rubber gasket shall be a pre-lubricated RFS (Reduced Friction Seal) as manufactured by Press-Seal Corporation, Fort Wayne, Indiana, or approved equal.
    c. The rubber gasket shall be the sole element relied on to assure a flexible watertight seal and meet ASTM C433 Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets and ASTM C1619
    d. All gaskets shall be extruded or molded in such a manner that any cross section will be dense, homogeneous, and free of porosity, blisters, pitting, or other imperfections. The gaskets shall be fabricated from an elastomeric material meeting the appropriate classification physical property requirements in section The base polymer shall be natural rubber, synthetic rubber, or a blend of both and be 100% first run material with no recycled content.
    e. Selection of the proper size rubber gasket for the pipe joint requirement, and installation thereof, shall be in strict conformance with the recommendations of the gasket manufacturer. Any testing shall also be conducted in strict conformance with the requirements of the gasket manufacturer.
    f. Gasketed joints will be able to withstand a saltwater environment.
9. External Sealing Bands: ASTM C877 with a width of 12 inches.
10. Grade Rings: Reinforced-concrete rings, of 6- to 9-inch total thickness, that match diameter of frame and cover.
11. Steps: Manufactured from deformed, 1/2-inch steel reinforcement rod complying with ASTM A 615/A 615M and encased in polypropylene complying with ASTM D 4101. Include pattern designed to prevent lateral slippage off step. Cast into sidewalls with steps at 12- to 16-inch intervals. Compliance with AASHTO M-199 and OSHA Regulation 29 CFR 1910.27.
12. Steps shall be cast in vertical alignment.
    a. M.A. Industries, Model PS-2-PF-SL;
    b. Press Seal Gasket, Model 14850;
    c. Or equal.

2.05 STRUCTURE AND PIPE CONNECTORS

A. New Structures: ASTM C 923, resilient, of size required, for each pipe connecting to manhole section.
    1. Joint material
        a. Lock Joint Flexible Manhole Sleeve by Interpace Corporation;
        b. KOR-N-SEAL;
        c. Or approved equal.

B. Existing Structures: ASTM C 923, resilient, of size required, for each pipe connecting to manhole section.
    1. Joint material
        a. KOR-N-SEAL;
        b. Kwik-Seal;
        c. Or approved equal.

C. Flexible Annular Space Filler: Manufactured by KOR-N-SEAL, Interpace Corp., or approved equal.

D. Manhole Frames and Covers:
   1. Standard Watertight Heavy Duty Manhole Frame and Cover
      a. Material: Grey Cast Iron, ASTM A48-83, Class 35B. Include diamond design with "SEWER" lettering cast into cover.
      b. AASHTO HS20-44 Highway Loading
      c. Paved and non-paved areas outside of AE/VE Flood Zone
      d. Bearing surface at seat of cover and frame shall be machined for uniform fit.
      e. Cover shall have two non-penetrating pick holes.
      f. Made in the USA
   2. Manufacturers:
      a. Campbell Foundry
      b. EJ-Global
      c. Or approved equal.

2.06 CONCRETE

A. General: Cast-in-place concrete according to ACI 318, ACI 350R, and the following:
   1. Cement: ASTM C 150, Type II.
   2. Fine Aggregate: ASTM C 33, sand.
   3. Coarse Aggregate: ASTM C 33, crushed gravel.
   4. Water: Potable.
   5. The concrete shall include a Crystalline Waterproofing Concrete Additive Xypex C-1000 NF in accordance with the manufacturer recommendations.

B. Portland Cement Design Mix: 4000 psi minimum, with 0.45 maximum water-cementitious materials ratio.
   1. The concrete shall include a Crystalline Waterproofing Additive Xypex C-1000.

C. Structure Channels and Benches: Factory or field formed from concrete. Portland cement design mix, 4000 psi minimum, with 0.45 maximum water-cementitious materials ratio. Include channels and benches in manholes.
   1. Channels: Brick-lined invert, formed to same width as connected piping, with height of vertical sides to three-fourths of pipe diameter. Form curved channels with smooth, uniform radius and slope. Eliminate protrusions that may impede flow of solids.
   2. Benches: Brick, sloped to drain into channel.

D. Ballast and Pipe Supports: Portland cement design mix, 3000 psi minimum, with 0.58 maximum water-cementitious materials ratio.
   1. Reinforcement Bars: ASTM A 615/A 615M, Grade 60, deformed steel.

E. Concrete Encasement (Insulation): 4000 psi minimum, with 0.45 maximum water-cementitious materials ratio.

2.07 MISCELLANEOUS

A. Brick: ASTM C32, Grade MS except Grade SS for manhole shelves.

B. Mortar: Composed by volume, of one-part portland cement and two parts sand. Do not add lime to mortar.

C. Grout: Form 818, Section M.03.06.

D. Filter Fabric: Form 818, Section M.08.01-19.

E. Flexible Epoxy Gel
   1. MasterSeal 614;
   2. Parson Poxy FG by Parson Environmental Products, Inc.;
   3. Sikagard by Sika;
   4. Or equal.

PART 3 - EXECUTION

3.01 EARTHWORK

A. Excavating, trenching, and backfilling are specified in Division 31 Section "Earthwork."

3.02 IDENTIFICATION

A. Materials and their installation are specified in Division 31 Section "Earthwork." Arrange for installing green warning tapes directly over piping and at outside edges of underground structures.

3.03 INSTALLATION, GENERAL

A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground sanitary sewerage piping. Location and arrangement of piping layout take design considerations into account.

B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream.

C. Install piping pitched down in direction of flow, at slope indicated.

D. Install gaskets, seals, insulation, sleeves, and couplings according to manufacturer's written instructions for using lubricants, cements, and other installation requirements.

E. Install gravity-flow piping of sizes and in locations indicated. Terminate piping as indicated.

F. Install and support pipes and fittings with bedding material. Do not use saddles, blocking or stones as pipe supports.

G. In structures, cut pipe flush with face of inside wall. Fill joint with annular space filler.

H. When work is not in progress, close open ends of pipe to prevent entry of groundwater, earth, or foreign materials.

3.04 PIPE JOINT CONSTRUCTION AND INSTALLATION

A. PVC Sewer Pipe and Fittings: As follows:
   1. Join pipe and fittings with gaskets according to ASTM D 2321 manufacturer’s written instructions.
   2. If full entry of pipe joint is not achieved, remove pipe and replace with new unit and gasket.

B. Joints for Ductile Iron Pipe:
   1. Installation of Mechanical Joints: Comply with AWWA C600 and manufacturer’s instructions.

C. Join piping made of different materials or dimensions with couplings made for this application. Use couplings that are compatible with and that fit both systems' materials and dimensions.

D. Close terminal ends of each type of pipe and fittings with PVC stoppers secured in place.

3.05 MANHOLE INSTALLATION

A. General: Install manholes, complete with appurtenances and accessories indicated.
   1. Set manhole base level on 8-inch minimum bedding material.
   2. Align manhole steps.
   3. Assemble manhole sections before connecting pipe to manhole.
   4. Point inside and outside joints with mortar. Close lifting holes with plastic plugs and mortar.

B. Prior to assembly, clean joint surfaces of precast concrete sections and butyl rubber sealant.

C. Form continuous channels and benches with concrete, brick and mortar, between inlets and outlet.

D. Install precast concrete manhole sections with gaskets according to ASTM C 891.

E. Annular Space: Fill space between sewer pipe and manhole on inner side of flexible pipe to manhole joint with flexible annular space filler.

F. Frames and Covers: Set frame in full bed of mortar. Cover bottom flange of frame with a thick, smooth-surfaced ring of mortar that extends to outside edge of masonry. Slope mortar ring to shed water away from frame.
   1. Set tops of frames and covers flush with finished surface of manholes that occur in pavements and lawns. Set tops 2 inches above finished grade of turf, unless otherwise indicated.
   2. At unpaved locations, install bolted and gasketed manhole covers.
   3. At unpaved locations (except for lawns), surround manhole frame and masonry with concrete anchor ring as indicated.

G. Frame Adjustment. Adjust frames with collars, masonry units or bricks.
   1. Maximum Adjustment Height: 12 inches.
   2. For adjustments greater than 12 inches, install riser section for structure.

3.06 INSTALLATION - VALVES

A. Install in accordance with manufacturer's instructions.

B. Clean valves of foreign matter prior to installation and inspect for damage. Fully open and close valves to verify parts are properly operating.

3.07 INSTALLATION - VALVE BOXES

A. Install valve boxes over each outside gate valve, unless otherwise indicated on layout drawings. Center valve boxes over valve. Tamp fill around each valve box to a distance of 4 feet on each side or to undisturbed trench face, if less than 4 feet.

3.08 Thrust Restraint

A. Thrust Restraints:
   1. Provide thrust restraint for plugs, caps, tees and bends deflecting 11-1/4 degrees or more, either vertically or horizontally.
   2. Provide thrust restraints at valves, unless otherwise securely anchored to prevent movement.

3.09 Restrained Joints: Provide at ductile-iron pipe.

A. In accordance with ANSI/AWWA C150, Ductile Iron Pipe Research Association design manual, and the following:
   1. Pressure: 1-1/2 times operating system pressure, or minimum of 150 psi, whichever is higher.

B. Install underground force main piping with restrained joints at horizontal and vertical changes in direction including bends and tees. Use restrained-joint piping, thrust blocks, anchors, tie-rods and clamps, and other supports.
   1. Use only one type of restraint throughout the Work.

3.010 CONCRETE PLACEMENT

A. Place cast-in-place concrete according to ACI 318 and ACI 350R.

3.011 CONNECTIONS TO EXISTING STRUCTURES

A. Core drill existing structures and install flexible pipe connector and pipe.

3.012 FIELD QUALITY CONTROL

A. Complete Field Quality Control work prior to placing permanent paving.

B. Clear interior of piping and structures of dirt and superfluous material as work progresses.
   1. Place plug in end of incomplete piping at end of day and when work stops.
   2. Flush piping between manholes and other structures to remove collected debris.

C. Inspect interior of piping and structures using CCTV to determine whether line displacement or other damage has occurred. Inspect after completion of backfill and compaction.
   1. Submit reports for each system inspection.
   2. Defects requiring correction include the following:
      a. Alignment: Less than full diameter of inside of pipe is visible between structures.
      b. Deflection: Flexible piping with deflection that prevents passage of a 5 percent deflection gage meeting ASTM D3034, Appendix X1.
      c. Crushed, broken, cracked, or otherwise damaged piping.
      d. Any visible leak found during the CCTV inspection.

D. Replace defective piping using new materials and repeat inspections until defects are within allowances specified.
   1. Reinspect and repeat procedure until results are satisfactory.

E. Test new structure and piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.
   1. Do not put into service before inspection and approval.
   2. Schedule tests and inspections with Engineer; provide at least two business day advance notice.
   3. Submit separate reports for each test.

F. Pipe Testing
   1. Safety
      a. Safety is the first priority. Contractor is responsible for all safety precautions. All safety precautions must be followed.
      b. Take precautions to eliminate free air inside the pipe during hydrostatic testing, including attention to filling sequence, air relief valves, flushing, and other best practices. Excessive test pressure pumping times can be a sign of entrapped free air.
      c. Prepare a plan for all field testing that covers procedure, communication, labor assignments, and contingencies. This plan shall be submitted to the Engineer for review prior to the start of testing.
      d. Safety dictates that personnel should not be in a manhole during low pressure air testing.
      e. Water must be used for field hydrostatic testing. Air cannot be used for pressure pipe testing.
         1) Contractor is responsible for providing water for hydrostatic testing.
      f. Test trenchless sections of an installation BEFORE they are connected to the existing pipe system.
   2. Deflection Testing for Non-pressure Pipe Bell and Spigot SDR35
      a. After completion of the backfill, the engineer or owner shall require that a deflection test be performed.
      b. Deflection tests should be conducted using a go/no-go mandrel. The mandrel's outside dimension shall be sized to permit no more than 5 percent deflection. The percent deflection shall be established from the base inside diameter of the pipe. The mandrel shall be approved by the owner or engineer prior to use. Lines that permit safe entry may allow other deflection test options, such as direct measurements.
   3. Low Pressure Air Testing for Non-pressure Pipe Bell and Spigot SDR35 Gravity Sewers:
      a. Perform low pressure air tests for all gravity sanitary sewers to be accepted. Tests will be made after pipe installation is complete, including installations of manholes. Test will be performed after trenches are backfilled and compacted and prior to the placement of permanent pavement.
         1) The Contractor is required to provide all equipment, test plugs in the required sizes, appurtenances, connecting hose or pipe, labor and materials necessary to conduct and control the low pressure air test. The test shall be performed using the below stated equipment, according to stated procedures and under

the supervision of the inspecting Engineer or his authorized Inspector. The Contractor or his subcontractor shall keep a written record, which will show the results of the tests conducted. The records should include sufficient data on length of line, pressure levels, time for pressure drop, and related features noted during the testing of each segment of the line. A copy of this record shall be given to the Engineer. Equipment used shall meet the following minimum requirements and shall be subject to approval by the Engineer.

2) Pneumatic plugs shall have a sealing length equal to or greater than the diameter of the pipe to be inspected.
3) Pneumatic plugs shall resist internal test pressures without requiring external bracing or blocking.
4) All air used shall pass through a single control panel.
5) Three (3) individual hoses shall be used for the following connections:
   a) From control panel to pneumatic plugs for inflation.
   b) From control panel to sealed line for introducing the low-pressure air.
   c) From sealed line to control panel for continually monitoring the air pressure rise in the sealed line.
6) All pneumatic plugs shall be seal tested before being used in the actual test installation. One length of pipe shall be laid on the ground and sealed at both ends with the pneumatic plugs to be checked. Air shall be introduced into the plugs to 25 psig. The sealed pipe shall be pressurized to 5 psig. The plugs shall hold against this pressure without bracing and without movement of the plugs out of the pipe.

b. All tests shall be conducted on the completed sewer pipeline between manholes. Testing of shorter sections of pipeline will only be permitted with the approval of the Engineer.

c. All gages, controls and appurtenances for equipment used to conduct the test will be located out of manholes. No one will be permitted in a manhole containing a test plug while air is under pressure in the pipeline being subjected to the test.

d. The Contractor shall determine the elevation of the ground water table in the area of the pipeline being subjected to the low-pressure air test.

e. After a manhole-to-manhole section of pipe has been completed, cleaned and the pneumatic plugs checked by the above procedure, the plugs shall be placed in the line at each manhole and inflated to 25 psig. Low pressure air shall be introduced into this sealed line until the internal air pressure reaches 4 psig greater than the average back pressure of any groundwater that may be over the pipe. At least two (2) minutes shall be allowed for the air pressure to stabilize.
   1) After the stabilization period, the pressure shall be set at 3.5 psig greater than the average back pressure due to groundwater and the air hose from the control panel to the air supply shall be disconnected. The portion of line being tested shall be termed "Acceptable" if the time required in minutes and seconds for the pressure to decrease from 3.5 psig greater than the average back pressure due to groundwater to 2.5 psig greater than the average back pressure due to groundwater is not less than the time shown for the given diameters in the following table.

f. Perform tests as follows:
   1) PVC Gravity Sewer Low-Pressure Air Test:
      a) Plastic Pipe: Perform air test according to ASTM F 1417, Time Pressure Drop Method, modified as follows.
      b) Minimum Allowable Time for 1.0 PSIG

Pipe	Minimum Time	Length (ft) for Min Time	Time (sec) for

Dia	(minutes)		Longer Length (L) (Ft.)
8	7:34	298	1.52L

c) Calculate time for longer test lengths only when test length exceeds the lengths shown in the above table.

d) If test section fails, recompute time to include lateral lengths not included in previous calculation. Use the following formula:

$$T = 0.085[(D_1^2L_1 + D_2^2L_2 \ldots.+ D_n^2L_n)/(D_1L_1 + D_2L_2 \ldots.+ D_nL_n)]K/Q$$

Where

T = Shortest time allowed for air pressure to drop 1.0 psig, seconds

K = 0.000419 ($D_1L_1 + D_2L_2 \ldots.+ D_nL_n$), but not less than 1.0

Q = 0.0015 cfm/sf

D_1, D_2, etc. = Nominal diameter of different size of pipe being tested

L_1, L_2, etc. = Respective lengths of different size pipes being tested

e) Modify air test pressure when groundwater is above top of sewer line. Install 6-inch or 8-inch diameter well points adjacent to manhole installations. Measure groundwater elevation prior to testing. Add to air pressure the following:

$$P = H / 2.3$$

Where

P = Pound of additional pressure

H = Height of groundwater elevation above sewer line, in feet

f) Do not exceed 9.0 psig for total air pressure.

g) After completion and acceptance of test, backfill well points with bedding material specified in Division 2 Section “Earthwork”. In roadways, terminate backfill below road subbase.

g. If the installation fails to meet the above requirements, the Contractor shall, at his own expense, determine the source of leakage and shall repair, replace and retest all defective work as necessary.

G. Cleanup

1. All water used in tests is the contractor’s responsibility to provide and to disposed of once tests are complete.
2. Test water cannot be disposed of by release to any downstream sewers.

END OF SECTION

SECTION 33 31 00
SANITARY UTILITY SEWERAGE COMPONENTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes the following:
   1. Sanitary sewer piping and appurtenances for gravity system.
   2. Sanitary sewer manholes.
   3. Connections to existing sanitary facilities.

B. Related Sections include the following:
   1. Division 2 Section “Earthwork” for trenching and backfill.

1.03 DEFINITIONS

A. PVC: Polyvinyl chloride plastic.

1.04 PERFORMANCE REQUIREMENTS

A. Gravity-Flow, Nonpressure-Piping and Manhole Pressure Ratings: At least equal to system test pressure.

1.05 SUBMITTALS

A. Product Certification: Pipe, valves, fittings, precast concrete units, metal items, and miscellaneous appurtenances.

B. Product Data: For the following:
   1. Pipe, valves, and fittings.

C. Shop Drawings: Include plans, elevations, details, and attachments for the following:
   1. Precast concrete manholes, including frames and covers.

D. Design Mix Reports and Calculations: For each class of cast-in-place concrete.

E. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

F. Record Drawings: In accordance with Section 01 78 00 and the following:
   1. Record location of system.
      a. Record location of new pipe and manhole structures.

1.06 QUALITY ASSURANCE

A. Form 816: State of Connecticut Department of Transportation Standard Specifications for Roads, Bridges and Incidental Construction and supplements.

B. Sewer and Water Line Separation. Perform work in accordance with New England Interstate Water Pollution Control Commission (NEIWPCC) Technical Report Number 16, and the following.

1. Horizontal Separation from Water Mains: 10 feet minimum.
   a. If existing conditions prevent 10-foot horizontal separation, install sewer in separate trench with top (crown) of sewer 18 inches below the bottom (invert) of existing water main.
2. Vertical Separation at Crossing of Sewer and Water Main. Install top of sewer 18 inches below bottom of water main. Locate sewer joints equidistant from water main joints, and install sewer joints at a maximum distance from water main joints.
   a. If existing conditions prevent minimum vertical separation, reconstruct water main with mechanical joint pipe for 10 feet beyond crossing; or relocate water main.
      1) Center one full-length of water main piping over sewer.
   b. Where a water main crosses under a sewer, provide adequate structural support for sewer to maintain line and grade.
3. When horizontal or vertical separation cannot be achieved, construct watertight, structurally-sound sewer system and water main of mechanical-joint cement-lined ductile iron pipe or equal.
   a. Pressure test each line to 150 psi.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Do not store PVC structures, pipe, and fittings in direct sunlight. Keep PVC items at ambient outdoor temperature.

B. Protect pipe, pipe fittings, and seals from dirt and damage.

C. Handle precast concrete manholes and other structures according to manufacturer's written rigging instructions.

D. Inspection: Upon delivery of pipe, assist Engineer in inspecting pipe.
   1. Straightness Tolerance: Maximum deviation of 1/16 inch per foot from straight line drawn between center of openings.
   2. Immediately remove lengths of pipe that fail straightness requirement.
   3. Rejection of Manufacturer and Product: Remove all pipe supplied by a manufacturer if more than five percent of shipment is rejected.

PART 2 - PRODUCTS

2.01 GRAVITY SEWER PIPE

A. PVC Sewer Pipe and Fittings: According to the following:
   1. PVC Sewer Pipe and Fittings, NPS 15 and Smaller: ASTM D 3034, SDR 35, for gasketed joints.
   2. Gaskets: ASTM D 3212, elastomeric seals; resistant to common sewage and industrial wastes including oil and groundwater.

2.02 MANHOLES

A. Precast Concrete Manholes: ASTM C 478, precast, reinforced concrete, of depth indicated, with provision for rubber gasketed joints.
   1. Base: Monolithic combination base and riser section. Increase thickness of precast concrete sections or add concrete to base section, as required to prevent flotation.

Fabricate pipe openings and sleeves to accommodate outside diameter of pipe to be connected.

2. Riser Sections: Lengths to provide depth indicated.
3. Top Section: Eccentric-cone type, unless concentric-cone or flat-slab-top type is indicated. Top of cone of size that matches diameter of grade rings.
4. Sealant: ASTM C 990, butyl rubber.
5. Grade Rings: Reinforced-concrete rings, of 6- to 9-inch total thickness, that match diameter of frame and cover.
6. Steps: Manufactured from deformed, 1/2-inch steel reinforcement rod complying with ASTM A 615/A 615M and encased in polypropylene complying with ASTM D 4101. Include pattern designed to prevent lateral slippage off step. Cast into sidewalls with steps at 12- to 16-inch intervals.
   a. M.A. Industries, Model PS-2-PF-SL;
   b. Press Seal Gasket, Model 14850;
   c. Or equal.

B. Pipe Connectors
   1. New Structures: ASTM C 923, resilient, of size required, for each pipe connecting to manhole section.
      a. Lock Joint Flexible Manhole Sleeve by Interpace Corporation;
      b. KOR-N-SEAL;
      c. Or equal.
   2. Existing Structures: ASTM C 923, resilient, of size required, for each pipe connecting to manhole section.
      a. Kwik-Seal;
      b. Press Boot by Press Seal;
      c. Or equal.

C. Flexible Annular Space Filler: Manufactured by KOR-N-SEAL, Interpace, or equal.

D. Manhole Frames: ASTM A 48, Grade 30, gray cast-iron rated for H-20 loading.
   1. Paved and Dry Unpaved Areas: Town standard manhole frame.
   2. Off-Road and Wet Areas: Bolted and gasketed.
   3. Manufacturer: LeBaron Foundry, Campbell Foundry, or equal.

E. Manhole Covers: Town standard cover pattern cast in aluminum rated for H-20 loading.
   1. Paved and Dry Unpaved Areas: Town standard manhole covers.
   2. Off-Road and Wet Areas: Bolted and gasketed.
   3. Manufacturer: LeBaron Foundry, Campbell Foundry, or equal.

2.03 CONCRETE

A. General: Cast-in-place concrete according to ACI 318, ACI 350R, and the following:
   1. Cement: ASTM C 150, Type II.
   2. Fine Aggregate: ASTM C 33, sand.
   3. Coarse Aggregate: ASTM C 33, crushed gravel.
   4. Water: Potable.

B. Portland Cement Design Mix: 4000 psi minimum, with 0.45 maximum water-cementitious materials ratio.

C. Structure Channels and Benches: Factory or field formed from concrete. Portland cement design mix, 4000 psi minimum, with 0.45 maximum water-cementitious materials ratio. Include channels and benches in manholes.
   1. Channels: Brick-lined invert, formed to same width as connected piping, with height of vertical sides to three-fourths of pipe diameter. Form curved channels with smooth, uniform radius and slope. Eliminate protusions that may impede flow of solids.
   2. Benches: Brick, sloped to drain into channel.

D. Ballast: Portland cement design mix, 3000 psi minimum, with 0.58 maximum water-cementitious materials ratio.
   1. Reinforcement Bars: ASTM A 615/A 615M, Grade 60, deformed steel.

E. Concrete Encasement (Insulation): 4000 psi minimum, with 0.45 maximum water-cementitious materials ratio.

2.04 MISCELLANEOUS

A. Brick: ASTM C32, Grade MS except Grade SS for manhole shelves.

B. Mortar: Composed by volume, of one part portland cement and two parts sand. Do not add lime to mortar.

C. Grout: Form 816, Section M.03.01-14.

D. Filter Fabric: Form 816 , Section M.08.01-26.

E. Corbel Seals
   1. Hydrocide 700 Flexible Epoxy Gel by Degussa Building Systems
   2. Cretex External Manhole Chimney Seal
   3. Or equal.

2.05 PROTECTIVE COATINGS

A. Description: Environmentally-safe crystalline dampproof coating; factory or field applied to the following surfaces:
   1. Concrete Manholes: On exterior surface.
   2. Available Manufacturer: DECO, Xypex, or equal.

PART 3 - EXECUTION

3.01 EARTHWORK

A. Excavating, trenching, and backfilling are specified Section 31 00 00 "Earthwork."

3.02 IDENTIFICATION

A. Materials and their installation are specified in Division 2 Section "Earthwork." Arrange for installing green warning tapes directly over piping and at outside edges of underground structures.

3.03 INSTALLATION, GENERAL

A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground sanitary sewerage piping. Location and arrangement of piping layout take design considerations into account.

B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, insulation, sleeves, and couplings according to manufacturer's written instructions for using lubricants, cements, and other installation requirements.

C. Install PVC sewer piping according to ASTM D 2321 and ASTM F 1668.

D. Install gravity-flow piping of sizes and in locations indicated. Terminate piping as indicated.
   1. Install piping pitched down in direction of flow, at slope indicated.

E. Install and support pipes and fittings with bedding material. Do not use saddles, blocking or stones as pipe supports.

F. In structures, cut pipe flush with face of inside wall. Fill joint with annular space filler.

G. When work is not in progress, close open ends of pipe to prevent entry of groundwater, earth, or foreign materials.

3.04 PIPE JOINT CONSTRUCTION AND INSTALLATION

A. PVC Sewer Pipe and Fittings: As follows:
   1. Join pipe and fittings with gaskets according to ASTM D 2321 and manufacturer's written instructions.
   2. If full entry of pipe joint is not achieved, remove pipe and replace with new unit and gasket.

B. Join piping made of different materials or dimensions with couplings made for this application. Use couplings that are compatible with and that fit both systems' materials and dimensions.

C. Close terminal ends of each type of pipe and fittings with PVC stoppers secured in place.

3.05 MANHOLE INSTALLATION

A. General: Install manholes, complete with appurtenances and accessories indicated.
   1. Set manhole base level on 8 inch minimum bedding material.
   2. Align manhole steps.
   3. Assemble manhole sections before connecting pipe to manhole.
   4. Point inside and outside joints with mortar. Close lifting holes with plastic plugs and mortar.

B. Prior to assembly, clean joint surfaces of precast concrete sections and butyl rubber sealant.

C. Form continuous channels and benches with concrete, brick and mortar, between inlets and outlet.

D. Install precast concrete manhole sections with gaskets according to ASTM C 891.

E. Annular Space: Fill space between sewer pipe and manhole on inner side of flexible pipe to manhole joint with flexible annular space filler.

F. Frames and Covers. Set frame in full bed of mortar. Cover bottom flange of frame with a thick, smooth-surfaced ring of mortar that extends to outside edge of masonry. Slope mortar ring to shed water away from frame.
   1. Set tops of frames and covers flush with finished surface of manholes that occur in pavements and lawns. Set tops 2 inches above finished grade of turf, unless otherwise indicated.
   2. At unpaved locations, install bolted and gasketed manhole covers.
   3. At unpaved locations (except for lawns), surround manhole frame and masonry with concrete anchor ring as indicated.

G. Frame Adjustment. Adjust frames with collars, masonry units or bricks.
   1. Maximum Adjustment Height: 12 inches.
   2. For adjustments greater than 12 inches, install riser section for structure.

H. Dampproofing: Provide as per manufacturer’s recommendations.

3.06 CONCRETE PLACEMENT

A. Place cast-in-place concrete according to ACI 318 and ACI 350R.

3.07 CONNECTIONS TO EXISTING STRUCTURES

A. Core drill existing structures and install flexible pipe connector and pipe.

3.08 CLOSING ABANDONED SANITARY SEWER SYSTEMS

A. Abandoned Piping: Close open ends of abandoned underground piping indicated to remain in place. Include closures strong enough to withstand hydrostatic and earth pressures that may result after ends of abandoned piping have been closed. Use either procedure below:
   1. Close open ends of piping with at least 8-inch thick, brick masonry bulkheads.

2. Close open ends of piping with threaded metal caps, plastic plugs, or other acceptable methods suitable for size and type of material being closed. Do not use wood plugs.

B. Backfill to grade according to Division 2 Section "Earthwork."

3.09 IDENTIFICATION

A. Materials and their installation are specified in Division 2 Section "Earthwork." Arrange for installation of green warning tapes directly over piping and at outside edges of underground manholes.
1. Use detectable warning tape over ferrous piping.
2. Use detectable warning tape over nonferrous piping and over edges of underground manholes.

3.010 FIELD QUALITY CONTROL

A. Clear interior of piping and structures of dirt and superfluous material as work progresses.
1. Place plug in end of incomplete piping at end of day and when work stops.
2. Flush piping between manholes and other structures to remove collected debris.

B. Inspect interior of piping and structures to determine whether line displacement or other damage has occurred. Inspect after completion of backfill and compaction.
1. Submit reports for each system inspection.
2. Defects requiring correction include the following:
a. Alignment: Less than full diameter of inside of pipe is visible between structures.
b. Deflection: Flexible piping with deflection that prevents passage of a 5 percent deflection gage meeting ASTM D3034, Appendix X1.
c. Crushed, broken, cracked, or otherwise damaged piping.
3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
4. Reinspect and repeat procedure until results are satisfactory.

C. Test new structure and piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.
1. Do not put into service before inspection and approval.
2. Schedule tests and inspections with Engineer; provide at least one business day advance notice.
3. Submit separate reports for each test.

D. Perform tests as follows:
1. Gravity Sanitary Sewerage Low-Pressure Air Test:
a. Plastic Pipe: Perform air test according to ASTM F 1417, Time Pressure Drop Method, modified as follows.
1) Minimum Allowable Time for 1.0 PSIG

Pipe Dia	Minimum Time (minutes)	Length (ft) for Min Time	Time (sec) for Longer Length (L) (Ft.)
6	5:40	398	0.854L

8	7:34	298	1.52L
12	11:20	199	3.418L

2) Calculate time for longer test lengths only when test length exceeds the lengths shown in the above table.

a) If test section fails, recompute time to include lateral lengths not included in previous calculation. Use the following formula:

1.1 $T = 0.085[(D_1^2L_1 + D_2^2L_2 \ldots.+ D_n^2L_n)/(D_1L_1 + D_2L_2 \ldots.+ D_nL_n)]K/Q$

1.2 Where

T = Shortest time allowed for air pressure to drop 1.0 psig, seconds

K = 0.000419 ($D_1L_1 + D_2L_2 \ldots.+ D_nL_n$), but not less than 1.0

Q = 0.0015 cfm/sf

D_1, D_2, etc. = Nominal diameter of different size of pipe being tested

L_1, L_2, etc. = Respective lengths of different size pipes being tested

3) Modify air test pressure when groundwater is above top of sewer line. Install 6 inch or 8 inch diameter well points adjacent to manhole installations. Measure groundwater elevation prior to testing. Add to air pressure the following:

1.3 $P = H / 2.3$

1.4 Where

P = Pound of additional pressure

H = Height of groundwater elevation above sewer line, in feet

a) Do not exceed 9.0 psig for total air pressure.

b) After completion and acceptance of test, backfill well points with bedding material specified in Division 2 Section “Earthwork”. In roadways, terminate backfill below road subbase

2. Manholes: Perform vacuum test in accordance with ASTM C1244 and as follows:

a. Test each manhole prior to backfilling.
b. Plug lift holes with a non-shrink grout.
c. Temporarily plug pipes entering manhole. Secure and brace pipes and plugs to prevent them from being drawn into the manhole during testing.
d. Place test head at inside top of cone section and inflate seal in accordance with manufacturer's recommendations.
e. Draw a vacuum of 10 inches of mercury. Shut off pump.
f. With valves closed, measure elapsed time for vacuum to drop from 10 inches to 9 inches. Manhole shall pass if time meets or exceeds values indicated in Table 1.

Table1 - Minimum Test Times

Manhole Diameter		
48 inches	60 inches	72 inches
Time to Drop Vacuum from 10 Inches to 9 Inches		
60 seconds	75 seconds	90 seconds

3. Leaks and loss in test pressure constitute defects that must be repaired.
4. Replace leaking piping and structures using new materials, and repeat testing until leakage is within allowances specified.

3.011 CLEANING

A. Clean dirt and superfluous material from interior of piping.

END OF SECTION

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SECTION 40 20 00
LIQUID PROCESS PIPING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.

1.02 DESCRIPTION

A. This Section includes the material requirements for pipe and pipe fittings for interior, exposed and buried process piping.

B. Related work specified elsewhere includes:
   1. Section 31 00 00 - Earthwork
   2. Section 33 11 00 - Water Utility Distribution Piping
   3. Section 33 30 00 - Sanitary Sewerage
   4. Section 33 31 00 – Sanitary Utility Sewerage Components
   5. Section 40 20 00 – Liquids Process Piping
   6. Section 26 - Electrical

1.03 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.

1.04 SOURCE QUALITY CONTROL

A. General - Each manufacturer shall test pipe and fittings supplied under this Section. Select test samples from the run of pipe proposed to be furnished to the Project. Unless Engineer elects to witness such testing, the manufacturer shall select the samples for testing. Advise Engineer at least two (2) weeks in advance of the time and location of the testing.

B. Alloy Steel - Certification outlined under ASTM A53.

C. Copper Pipe - Inspect and test pipe in accordance with ASTM B88.

D. Polyvinyl Chloride Pipe - Test as follows:

Test	In Accordance With
Quick Burst	ASTM D1599
Sustained Pressure	ASTM D1598
Acetone Immersion	ASTM D2152

E. Ductile Iron Pipe - Inspect and test DIP in accordance with AWWA C151.

F. Additional Testing - In addition to the tests required above, Owner may perform additional testing on pipe delivered to the Site.

1.05 SUBMITTALS

A. See Section 01 33 00.

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 Article 1.04.
   1. Submit three (3) copies of each certification.

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 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. Store in accordance with manufacturer's approved instructions.

B. Carefully handle all pipes 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.

F. In general, unless otherwise shown, the following is a list of the type of pipe required, not including piping furnished under Specification Sections, to be furnished and installed for the interior piping for a specific function:

Pipe Type		Function
CU	-	City Water (CW) smaller than 3-inch
1.1.1.1.1.1	-	Seal Water Piping
1.1.1.1.1.2	-	Seal Water Drain Piping
DI	-	All process and drain piping unless otherwise noted
GLDI	-	All process scum lines unless otherwise noted
POLY	-	Sampler lines
1.1.1.1.1.3 CPVC	-	Chemical containment pipe - carrier and containment
1.1.1.1.1.4 PVC	-	Sanitary sewer
1.1.1.1.1.5	-	Sleeves or conduits for sampler lines
1.1.1.1.1.6	-	Sump Pump Discharge
1.1.1.1.1.7	-	Polymer
1.1.1.1.1.8	-	Process Vents
1.1.1.1.1.9	-	Odor control duct (below grade)
1.1.1.1.1.10	-	Condensate drains

- Sodium Hypochlorite, Sodium Hydroxide, and polymer chemical piping and drains
- All Chemical Storage Tanks connecting piping including fill, overflow, drain, and vents

SS - Low Pressure Air (Air) lines

PART 2 - PRODUCTS

2.01 DUCTILE IRON PIPE

A. Ductile iron pipe shall be the sizes indicated on the drawings and shall be grade 60-42-10. The pipe shall be centrifugally cast and manufactured in accordance with ANSI A21.50 and A21.51. All ductile iron pipe shall be cement lined to twice the thickness specified in ANSI A21.51 and ANSI 21.4 and shall be asphalt seal coated except as noted herein.

1. All exterior ductile iron pipe smaller than 24 inch diameter shall be Pressure Class 350. All larger pipe sizes shall be Pressure Class 250.
2. Ductile iron pipe and fittings used for scum suction and discharge piping shall be glass lined with an average of 0.008 inch in glass thickness. This requirement shall apply to both interior and exterior piping. Glass shall have a hardness of approximately 400 on the Knoop scale or 5.5 on the Mohr scale. The glass shall be resistant to corrosion and shall withstand an instantaneous differential thermal shock of 300 degrees F. Glass lining shall also be furnished on the cleanout fittings from the pipe up to the isolation valve.
3. Exterior ductile iron pipe joints shall have push-on joints with neoprene gaskets and shall be installed as recommended by the manufacturer. The joints shall conform to ANSI A21.11.
4. All fittings associated with exterior ductile iron pipe shall be cast or ductile iron conforming with ANSI A21.10. Fittings shall have mechanical joints, be rated for 150 psi working pressure and conform to ANSI A21.11. All fittings shall be coated and lined as specified for its associated pipe and use.
5. All interior ductile iron pipe shall be a minimum thickness Class 53 and shall be designed and manufactured in accordance with ANSI A21.51.
6. Interior ductile iron pipe joints shall be flanged with gaskets, bolts and nuts conforming to ANSI A21.15. Flanges shall be flat faced and gaskets shall be ring type.
7. All fittings associated with interior ductile iron pipe shall be cast or ductile iron conforming with ANSI A21.10. Fittings shall have flat faced flanges, full face gaskets, be rated for 150 psi working pressure and be complete with nuts and bolts.
8. As an alternate to the flanged pipe joints and fittings, the Contractor may, at his option use the rigid grooved piping method for cast pipe. This method will only be acceptable provided the Contractor uses this method of jointing for all interior cast and ductile iron piping systems.
   a. Couplings shall be Victaulic Style 31 or NAPPCO Series 300 or equal. Joining of fittings to specified flanged faces (such as at pumps and valves) shall be either by (a) Victaulic Style 341 and 342 flanges or by (b) flange to groove adaptors or by special grooved and flanged fittings. Joining of pipes to specified flanged faces shall be either by (a) or (b) above. Adaptor type flanges of the Uni-Flange Series 400 type may be used only when joining interior pipes to wall pipes.
   b. Gaskets shall be of Buna-N. Couplings shall be of malleable iron in accordance with ASTM A-47 Grade 32510. Bolts shall be oval neck track head type with hexagonal

heavy nuts per ASTM A-183 and A-194. Flanges for the Uni-Flange type or Victaulic Series 341 and 342 type or equal as approved shall be of ductile iron.

c. Grooved ends of piping and fittings shall be in accordance with the recommendations of the manufacturer of the couplings and adaptors as approved.

9. All interior plant water and city water lines shall be insulated with ½-inch thick fiberglass insulation. Insulation shall be furnished with a white Kraft reinforced foil jacket. Insulation shall be Owens Corning ASJ/SSL-II, Certainteed 500, or equal. Materials containing asbestos are not acceptable.

2.02 POLYVINYL CHLORIDE PIPE (PVC)

A. Polyvinyl Chloride Pipe for interior pressure service shall be Schedule 80 Normal Impact pipe conforming to ASTM D-1785, Type 1, Grade 1. All PVC plastic pipe fittings shall be socket type conforming to ASTM D-2467 or flanged fittings as shown on the drawings. All joints shall be made up with solvent cements conforming to ASTM D-2564 according to the Standard Recommended Practice for Making Solvent-Cemented Joints with PVC Pipe and Fittings, ASTM D-2855. In cases where the standard recommended practice is exceeded in quality of workmanship by manufacturers instructions, the installation shall be according to the manufacturer's instructions. All exterior PVC pressure piping and where imbedded in concrete shall be SDR 21 pipe and have socket type joints with neoprene gaskets. Interior PVC piping shall have socket type flanged connections unless specifically shown otherwise. All metal fasteners shall be galvanized.

B. Polyvinyl Chloride Pipe, couplings and fittings for buried gravity sewer and odor piping shall conform to the ASTM Designation D3034, with an SDR of 35 unless otherwise shown on the drawings or ASTM Designation F789. All gaskets shall be neoprene.

1. Joints for PVC pipe shall be push-on joints using permanently bonded neoprene ring joints. Such joints shall be installed in accordance with the pipe manufacturer's written instructions. Any joint which is not properly made, shows signs of leakage or is in the opinion of the Engineer, defective in any way shall be redone to the satisfaction of the Engineer.
2. Wye Branches or Tees shall be of the class and type so as to be compatible with the pipe used.
3. Pipe utilized for service connections shall be six inches in diameter and be manufactured of PVC. PVC pipe shall conform to ASTM D3034, with an SDR of 35 or ASTM F789. Joints for PVC pipe shall be push-on using neoprene ring gaskets.

C. Double Containment Pipe -

1. The double containment pipe shall be made up of a Schedule 80 PVC primary carrier pipe and a Schedule 40 PVC secondary containment.
2. The primary carrier pipe shall be Schedule 80 PVC pipe Type I, Grade 1 conforming to the requirements of ASTM D1784 and ASTM D1785. Pipe shall be rigid, homogeneous throughout, and free from visible cracks, holes and foreign inclusions, and other defects.
3. Interstitial supporting devices used to center and support the primary piping within the secondary containment piping shall be Polypropylene Spider Clips or C-Type, according to ASTM and ANSI.
4. All listed secondary containment pipe and components shall be Schedule 40 materials. Pipe shall have Schedule 40 thickness according to ASTM D1784. All listed pressure fittings shall be Schedule 40 according to ASTM D2466.

5. All other unlisted components that are intended for use as pressure retaining components shall have sufficient thickness and reinforcement so as to be able to maintain the same pressure ratings as the equivalent Schedule 80 pipe.
6. All pre-fabricated pressure fittings or components shall be pretested by the manufacturer to 150 psi, all drainage systems to 20 psi.
7. The secondary containment piping system shall be supplied with test reducers, terminating reducers, with drain fittings designed to allow a valve attachment and compression seals as required to install and test the piping system in accordance with the manufacturer's recommendations and the plans and specifications.
8. The double containment piping system shall be a pre-fabricated system as manufactured by Guardian by IPEX, Rovanco, or equal. The system shall be designed, fabricated, installed and tested in accordance with manufacturer's recommendations and as specified herein and shall be suitable for the intended service.

2.03 PIPE INSULATION

A. Insulation shall be 2 inches thick, heavy-density, sectional, pre-formed glass-fiber insulation with factory-applied, vinyl-coated, and embossed vapor jacket, self-sealing lap, and UL rating. Laps and butt joints shall be sealed with pressure-sensitive joint sealing tape of the same finish as the insulation jacket, to provide a continuous vapor seal. Insulation shall be Owens-Corning, Fiberglass ASJ/SSL-11; Manville, Micro-Lock 650 with AP-T jacket; or equal.

B. Insulate fittings with pre-molded insulation or mitered segments, wired in place, and finished with a thin coat of insulating cement, or wrapped with soft fiberglass insulation inserts covered with pre-molded PVC fitting covers. Secure cover and wrap throat and seams with matching PVC tape. Fitting covers shall be Zeston, Speedline, or equal.

C. Insulation at each pipe hanger and support shall include preformed rigid cell, half-round insulation, with factory-applied, vinyl-coated, and embossed vapor jacket, self-sealing lap, and UL rating. Minimum length shall be 8 inches, centered at each pipe hanger, and equal in thickness to the adjacent insulation.

D. Cover piping and insulation with 0.016-inch thick aluminum jacket. The jacket shall be held in place by a continuous friction type joint, providing a positive weatherproof seal over entire length of jacket. The circumferential joints shall be secured with preformed snap straps containing weatherproof sealant. Cover outdoor fittings with matching preformed aluminum jackets, two-piece elbows and flange covers, secured with stainless steel bands. Fitting covers shall be as manufactured by Childers, Pabco, or equal.

PART 3 - EXECUTION

3.01 INSPECTION

A. Before installation work begins inspect and verify that the Work is complete and correct, to the point where the work under this Section may properly proceed.

B. Verify that equipment shop drawings have been submitted and have been approved by Engineer.

C. Make necessary field measurements to ensure precise fit of all items. Utilize approved shop ratings for equipment dimensions.

D. Reinspect each length of pipe, fitting, and other pipeline appurtenances before installation for conformance, defects, and errors.

E. Do not install piping systems until conditions are satisfactory.

3.02 PREPARATION

A. Thoroughly clean interior of pipes, fittings, valves and appurtenances, joint surfaces, and gaskets before installation.

B. Tighten valve stuffing boxes and check in open and closed positions to insure that parts are in satisfactory working condition. See Section 40 20 00 Liquids Process Piping for additional requirements.

3.03 PIPE INSTALLATION - GENERAL

A. Pipe installations shall be complete in every respect, insuring that systems operate satisfactorily and quietly, free from unusual movement and vibration.

B. Cutting, fitting, repairing, and finishing of masonry, concrete, metal and carpentry work that may be required for the installation of piping shall be done by craftsmen skilled in their respective trades.

C. Use only proper and suitable tools and appliances for the safe and convenient handling and installing of the pipe and fittings. Take care to prevent damage to any interior or exterior coatings.

D. Connect piping to equipment, with unions or companion flanges, so located that piping may be readily dismantled from equipment. See Section 40 20 00 Liquids Process Piping for unions required in other locations. Also, provide restrained or harnessed flexible couplings on inlet and discharge piping of equipment so that the equipment will be free from forces transmitted by the piping.

E. Provide isolation valves on all branches, sub-branches and equipment connections, whether shown on drawings or not.

F. Make connections between dissimilar metals with dielectric unions.

G. Install piping so that it will be free to expand and contract without damaging itself or its supporting structure. Provide self-equalizing type expansion joints in all runs of 90 feet or more, or more often where shown on the drawings. Furnish and install guides and anchors.

H. In structural slabs less than 8 inches thick, pipes having "D" over 1 inch are prohibited. "D" is the maximum outside diameter or dimension of the pipe. In structural slabs 8 inches and thicker, "D" shall not exceed 2 inches. Where pipes are permitted in the slab, the center-to-center spacing shall not be closer than 3 "D" and in no case less than 2 inches clear.

I. Install all pipes passing through walls and floors in pipe sleeves, or use wall pipes, and accurately locate before placing concrete and during the construction of masonry walls.

J. Except where otherwise specified or shown, use standard strength Type 304 stainless steel pipe sleeves of sufficient size to provide a clear annular space of 1/4-inch to 1/2-inch around the pipe. Set wall sleeves flush with wall surfaces and set floor sleeves 4 inches above finished floor and flush with underside of floor or as shown on the Drawings.

K. Accurately cut pipe with mechanical cutters. Install pipe without springing or forcing, and in true, level and square lines. Carefully fit pipe to the equipment, without forcing either the pipe or equipment. After the piping has been placed, check the equipment for level and alignment.

L. Comply with applicable sections of Division 2 for underground and under slab installation.

3.04 INSTALLATION OF FLANGED PIPING

A. Bring all joints in exact alignment and insert gaskets and bolts or studs in their proper places. Uniformly tighten bolts or studs around the joints. Where stud bolts are used, apply equal pressure to each nut on the studs.

3.05 INSTALLATION OF THREADED PIPING

A. All ferrous threaded joints shall have long taper threads which shall be made tight with oil and graphite paste or Teflon thread tape applied to external threads only. Ream pipe 1-1/2 inches and smaller to remove scale and dirt.

B. Make up PVC joints with Teflon thread tape.

C. No close nipples are allowed.

D. Apply wrenches on valves and fittings directly over the joint being tightened. On PVC pipe, use strap wrenches. Assembly with jaw type pipe wrenches is not permitted on PVC pipe.

E. Use a specially made adapter of PVC to metal connections.

F. Joints which are required to be backed off shall be entirely disjointed. Wipe all threads clean, reapply joint compound or thread tape and reassemble connection.

3.06 INSTALLATION OF BURIED PIPING

A. Install buried water pipe in accordance with Section 33 11 00 and Section 33 31 00 Sanitary Utility Sewerage Components.

3.07 INSTALLATION OF DOUBLE CONTAINMENT PIPING

A. All installation procedures shall be according to the manufacturer's specific recommendations. The manufacturer shall furnish the services of a competent representative to supervise the Contractor's personnel during the installation.

B. Secondary containment joints shall be solvent-cemented joints using HERCULES heavy body-slow set PVC cement ASTM D2564, made in accordance with ASTM D2855 procedure. The splitting and re-welding of fitting shall not be permitted. The use of hot gas welding for pressure retaining joints shall be kept to those locations where it is deemed necessary by the manufacturer.

C. Personnel installing solvent cemented joints shall be qualified for such bonding practices according to the bonding qualification procedures described in ASME B 31.3, Chapter VII for bonding of plastic piping. The bonding qualification procedure shall be that as written and provided by the manufacturer.

D. Secondary containment piping shall be tested in accordance with the manufacturer's recommendations. The secondary containment piping shall be pneumatically tested at 5 psi for a minimum duration of 2.5 hours. It is imperative that a working pressure regulator be used during the pneumatic test to insure that over pressurization beyond 10 psi does not occur.

3.08 TESTING

A. General - Conduct pressure and leakage tests on all newly installed pipelines. Furnish all necessary equipment and material and make all connections to the pipe, as required. The Engineer will monitor the tests. Test pressures shall be as specified in the Pipe Schedule.

B. Preparation and Execution
   1. Buried Pressure Piping
      a. Completely backfill the trench prior to conducting the final acceptance tests on buried pressure piping that is to be hydrostatically tested. The Contractor may, if field conditions permit, as determined by the Engineer, partially backfill the trench and leave the joints open for inspection and conduct an initial service leak test. The acceptance test shall not, however, be conducted until all backfilling has been completed.
      b. Buried pressure piping that is to be pneumatically tested or subjected only to an initial service leak test shall have all joints exposed for the acceptance test.
   2. Exposed Pressure Piping: Complete installation of piping, including all supports, hangers, and anchors prior to conducting tests on exposed piping.

C. Hydrostatic Leak Test
   1. Equipment: Furnish graduated containers, calibrated pressure gauges and hydraulic force pump with suitable hose and suction pipe as required.
   2. Procedure: Test water shall be clean and of such quality as to minimize corrosion of the materials in the piping system. Vents at all highpoints of piping system shall be opened to purge air pockets while the piping system is filling. Venting during the filling of the system also may be provided by the loosening of flanges having a minimum of four bolts or by the use of equipment vents. All parts of the piping system shall be subjected to the test pressure specified in the Piping Schedule.
   3. The hydrostatic test pressure shall be continuously maintained for a minimum of 30 minutes and for such additional time as may be necessary to conduct examinations for leakage. Examination for leakage shall be made at all joints and connections. The piping system, exclusive of possible localized instances at pump or valve packing, shall show no visual evidence of weeping or leaking. Any visible leakage shall be corrected at the Contractor's sole expense.
   4. Buried Water and Wastewater Pressure Lines
      a. Where any section of pipe is provided with concrete thrust blocking, do not make the pressure test until at least five 5 days have elapsed after the thrust blocking is installed. If high-early cement is used for thrust blocking, the time may be reduced to two 2 days. When testing cement-mortar lined piping, slowly fill the section of pipe to be tested with water and allow to stand for 24 hours under slight pressure to allow the cement-mortar lining to absorb water.
      b. Expel all air from the piping system prior to testing and apply and maintain the specified test pressure by means of the hydraulic force pump. Valve off the piping system when the test pressure is reached and conduct the pressure test for 2 hours, reopening the isolation valve only as necessary to restore the test pressure. The pump suction shall be in a barrel or similar device, or metered so that the amount of water required to maintain the test pressure may be measured accurately. This measurement represents the leakage, which is defined as the quantity of water

necessary to maintain the specified test pressure for the duration of the test period. No pipe installation will be accepted if the leakage is greater than the number of gallons per hour as determined by the following formula:

$$L = \frac{SD(P)\ 1/2}{133{,}200}$$

In the above formula:

L = Allowable leakage, in gallons per hour
S = Length of pipe tested, in feet
D = Nominal diameter of pipe, in inches
P = Test pressure during the leakage test; in pounds per square inch.

c. The Contractor shall correct any leakage greater than the allowance determined under this formula at the Contractor's sole expense.

D. Initial Service Leak Tests
1. Equipment: Reference 3.09 C.1, or utilize the pump connected to the piping system.
2. Procedure: The initial service leak test shall be performed by gradually bringing the piping system up to normal operating pressure and holding it there continuously for a minimum time of 10 minutes. Examination for leakage shall be made at all joints and connections. The piping system, exclusive of possible localized instances at pump or valve packing, shall show no visual evidence of weeping or leaking. Any visible leakage shall be corrected at the Contractor's sole expense.

E. Test Records - Records shall be made of each piping system installation during the test. These records shall include:
1. Date of test.
2. Description and identification of piping tested.
3. Test pressure.
4. Remarks, to include such items as:
a. Leaks (type, location)
5. Certification by Contractor and signed acknowledgment by Engineer.

END OF SECTION

SECTION 40 91 23
INSTRUMENTATION SLUDGE SENSOR

PART 1 - GENERAL

1.01 DESCRIPTION

A. Sensors, cables, and associated equipment for measuring the sludge blanket profile in wastewater treatment gravity sludge thickeners. Controllers and modules required for a complete monitoring system as shown in Contract Drawings.

B. Scope
   1. Furnish, install, calibrate, test, adjust, and place into satisfactory operation sludge interface level measurement system as shown on the Drawings and specified herein.
   2. The Drawings and Specifications illustrate and specify functional and general construction requirements of sludge interface level sensors and do not necessarily show or specify all components, wiring, piping, and accessories required to make a completely integrated system. Provide all components, piping, wiring, accessories, and labor required for a complete and integrated system.

C. Coordination: Coordinate with other suppliers for installation of all items specified herein and required to ensure the complete and proper interfacing of all the components and systems.

1.02 PERFORMANCE REQUIREMENTS

A. Design Requirements
   1. Design sludge interface level measurement system for continuous monitoring IN the gravity thickeners.
   2. Sludge blanket profile measurement system shall be a component of a process monitoring system capable of monitoring up to 20 parameters simultaneously on each controller. Measurement locations shall be networked together in a linear, star, or branched topology with a single 2-wire cable that distributes 12 V power and communications.
   3. The sludge blanket profile sensor assembly shall be a separate unit from the sensor connection cable and able to be located anywhere in the monitoring network a sensor connection terminal is available.

B. Performance Requirements
   1. Operating Range
      a. Temperature: 31°F to 122°F (0°C to 50°C)
      b. Pressure range: < 0.3 bar
      c. pH: 4 S.U. to 12 S.U.
      d. Flow velocity: 10 ft./sec.
      e. Immersion depth: 2 in. to 10 ft.
   2. Measuring range: 1.32 ft. to 49.2 ft.
   3. Measuring Accuracy: 4 in.
   4. Resolution: 0.4 in.

1.03 QUALITY ASSURANCE

A. Acceptable Manufacturers:
   1. Furnish sludge interface level measurement system by the named manufacturers.

2. The named manufacturers have been specified to establish the standard of quality and performance of the equipment to be supplied.
3. Manufacturer shall be ISO 9001 certified.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Sludge blanket profile measurement system shall not be delivered to the site until all product information and system shop drawings for the system have been approved.

B. Delivery and Acceptance Requirements: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

C. Storage and Handling Requirements:
1. Store and handle materials in accordance with manufacturer's instructions.
2. Keep materials in manufacturer's original, unopened containers and packaging until installation.
3. Store materials in clean, dry area indoors.
4. Protect materials during storage, handling, and installation to prevent damage.
5. Temperature range for storage: 23°F to 122°F (-5°C to 50°C)

1.05 SUBMITTALS

A. Product Data
1. Sensor operating manual.
2. Mounting bracket / sensor holder installation instructions.

B. Manufacturer's Certifications: Submit manufacturer's certification that materials comply with specified requirements and are suitable for intended application.

C. Warranty documentation: Submit manufacturer's standard warranties.

PART 2 - PRODUCTS

2.01 GENERAL

A. Measurement principle shall be acoustic by measuring the elapsed time of acoustic echoes from a submersible ultrasonic transducer to interfaces between layers of varying density.

B. Connect sludge interface level sensor to field-mounted junction box or expansion modules specified in Section 40 95 00 with sensor connecting cable as specified in Section 2.3.A.2.

C. Sludge interface level measuring system components shall be designed to be part of a process control system with enhanced protection from overvoltage due to lightning and power supply fluctuations according to EN 61326 when installed using manufacturer's recommended components per manufacturer's instructions.

2.02 MANUFACTURER

A. Provide products from the following manufacturer:
1. YSI, Incorporated, 1700/1725 Brannum Lane, Yellow Springs, OH 45387. 1-800-765-4974.

2.03 MANUFACTURED UNIT

A. The sludge interface level measurement system consists of the following:

1. Model IFL 701 IQ Sludge Interface Level Sensor [Model IFL 700 IQ Sludge Interface Level Sensor].
    a. The sensor shall be factory-calibrated and ready for measurement out of the box with input of sensor immersion depth and settling tank depth.
    b. The sensor shall include intelligent signal processing to filter out undesirable signals.
    c. In combination with the single 2020XT controller to be provided, the sensor shall generate a graphical representation of the water column.
    d. The sensor shall include self-diagnostics to detect moisture contamination in the sensing element.
    e. The sensor shall have a digital output signal.
    f. The sensor shall detach from sensor cable allowing for easy replacement or repair.
    g. The sensor shall include a maintenance-free and wear-free mechanical non-contacting wiper. Models with replaceable wiper blades and o-rings shall not be accepted.
2. SACIQ-x,x [SACIQ-x,x SW] sensor connection cable.
    a. Capable of transmitting digital communications and low voltage (24V) power
    b. Integrated shield.
    c. Connections
        1) Sensor-side: Quick fastener (threaded)
        2) Controller-side: tinned conductors

2.04 MATERIALS

A. Sensor
1. Body: V4A Stainless Steel 1.4571 (equivalent to 316Ti)
2. Plug head and transition unit: POM
3. Ultrasound unit: PVC-C
4. Safety
    a. Certification: CE, cETL, ETL
5. Warranty: 2 years

B. Sensor connection cable
1. Conductors: Tin-coated stranded copper wire.
2. Coupling ring: Stainless Steel 1.4571 (equivalent to 316Ti)
3. Ring: POM
4. Screw: Stainless Steel V4A
5. O-ring: NBR
6. Enclosure: POM
7. Nut: Stainless Steel 1.4571 (equivalent to 316Ti)
8. Protection ring: POM
9. Cable sheath: PUR
10. Protective cap: PVC
11. Protection rating: IP68 (waterproof)
12. Warranty: 12 months

2.05 ACCESSORIES

A. Handrail Sensor mounting assemblies:
1. YSI model 481208Y IFL-PM handrail mounting bracket

2. YSI model 481206Y IFL-E deflector plate

PART 3 - EXECUTION

3.01 INSTALLATION

A. Immersion sensors:
   1. Immerse sensor to provide a minimum distance of 2 in. (5 cm) between the bottom face of the sensor and the water surface.
   2. Immerse sensor to provide a minimum distance of 16 in. (40 cm) between the bottom face of the sensor and the top of the sludge layer.
   3. Install the sensor in a vertical orientation with the transducer on the bottom.
   4. Install sensor a minimum distance from tank walls and other obstructions in accordance with manufacturer's instructions.

B. Sensor connection cable
   1. Bend radius
      a. Permanent bend: not less than 3.2 in. (80 mm).
      b. One-time bend: not less than 2 in. (50 mm).

3.02 START-UP

A. Install sludge interface level sensors in strict accordance with the manufacturer's instructions and recommendations.

B. Manufacturer's representative will include a half-day of start-up service by a factory-trained technician, if requested.
   1. Contractor will schedule a date and time for start-up.

2. Contractor will require representatives of the following be present during the start-up:
   a. General contractor
   b. Electrical contractor
   c. YSI factory-trained representative
   d. Owner's personnel
   e. Engineer

END OF SECTION

SECTION 40 94 13
PROCESS MONITORING SYSTEM UNIVERSAL CONTROLLERS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Section Includes
   1. Multi-parameter universal controllers as part of a process monitoring system that includes display terminals, and associated modules that control, indicate, record, and transmit signals from multiple online sensors in water resource recovery facilities.

B. Scope
   1. Furnish, install, configure, and place into satisfactory operation multi-parameter terminal /controllers as shown on the Drawings and specified herein.
   2. The Drawings and Specifications illustrate and specify functional and general construction requirements of universal controllers and associated networks but do not necessarily show or specify all components, wiring, piping, and accessories required to make a completely integrated system. Provide all components, piping, wiring, accessories, and labor required for a complete and integrated process monitoring and control network.

C. Coordination: Coordinate with other suppliers for installation of all items specified herein and required to ensure the complete and proper interfacing of all process monitoring and control network components and systems.

1.02 SYSTEM DESCRIPTION

A. Design Requirements
   1. Design universal controller system for continuous operation outdoors.
   2. Connect universal controller directly to expansion modules specified in this section and in Section 40 95 23 Process Control Expansion Modules and sensors specified in sections for primary process measurement devices.
   3. Universal controller system components shall be designed to be part of a system that has the following capabilities and features:
      a. Enhanced protection against overvoltage due to lightning and power supply fluctuations according to EN61326 when installed using manufacturer's recommended components per manufacturer's instructions.

B. Powered from a centralized power supply. 24VDC loop powered communication.

C. Performance Requirements
   1. Operating range
      a. Temperature: -4°F to 131°F (-20°C to 55°C)
      b. Relative humidity: less than or equal to 90% (yearly average)
      c. Altitude: less than or equal to 6,562 ft. (2,000 m) above mean sea level

1.03 QUALITY ASSURANCE

A. Acceptable Manufacturers:
   1. Furnish universal controllers by the named manufacturers.

2. The named manufacturers have been specified to establish the standard of quality and performance of the equipment to be supplied.
3. Manufacturer shall be ISO 9001 certified.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Terminal/controllers shall not be delivered to the site until all product information and system shop drawings have been approved.

B. Delivery and Acceptance Requirements: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

C. Storage and Handling Requirements:
1. Store and handle materials in accordance with manufacturer's instructions.
2. Keep materials in manufacturer's original, unopened containers and packaging until installation.
3. Store materials in clean, dry area indoors.
4. Protect materials during storage, handling, and installation to prevent damage.
5. Temperature range for storage: -13°F to 149°F (-25°C to 65°C)

1.05 SUBMITTALS

A. Product data
1. Operating manual for universal controller and associated modules.
2. Mounting bracket installation instructions.

B. Manufacturer's Certifications: Submit manufacturer's certification that materials comply with specified requirements and are suitable for intended application.

C. Warranty documentation: Submit manufacturer's standard warranties.

PART 2 - PRODUCTS

2.01 MANUFACTURER

A. Provide products from the following manufacturer:
1. YSI Incorporated, 1700/1725 Brannum Lane, Yellow Springs, OH 45387. 1-800-765-4974.

2.02 MANUFACTURED UNIT

A. The multi-parameter controller consists of the following:
1. Model DIQ/S 282-CR3 20-channel universal controller.
a. Inputs
1) 1 SensorNet connection
2) 1 x 100 to 240 VAC power
b. Outputs
1) 3 current outputs
2) 3 relay outputs
c. Display
1) Black/white, backlit

2) Resolution: 320 (W) x 240 (H) pixels
3) Viewable area: 2.76 in. (W) x 2.07 in. (H)
4) Display of measured values: lists or daily, weekly or monthly xy chart.

d. Function/operation
1) 3 function keys
2) 2 confirmation/switching keys
3) 2-directional navigation key

e. Datalogger
1) Total storage: Up to 520,000 measurements in csv format.
2) User programmable logging interval: 1 minute to 60 minutes.

f. Multi-function USB-A port
1) Electronic key
2) Firmware upgrade
3) Data transfer

g. Cable glands: M 16 x 1.5, 4 total, with screw plug
h. Power output: 6.5W
i. Controller shall use a menu-driven operating system.
j. Each universal controller shall control 1 to 2 sensors.

2. Model DIQ/S 284-CR6 20-channel universal controller.
    a. Inputs
        1) 3 SensorNet connection
        2) 1 x 100 to 240 VAC power
    b. Outputs
        1) 6 current outputs
        2) 6 relay outputs
    c. Display
        1) Black/white, backlit
        2) Resolution: 320 (W) x 240 (H) pixels
        3) Viewable area: 2.76 in. (W) x 2.07 in. (H)
        4) Display of measured values: lists or daily, weekly or monthly xy chart.
    d. Function/operation
        1) 3 function keys
        2) 2 confirmation/switching keys
        3) 2-directional navigation key
    e. Datalogger
        1) Total storage: Up to 520,000 measurements in csv format.
        2) User programmable logging interval: 1 minute to 60 minutes.
    f. Multi-function USB-A port
        1) Electronic key
        2) Firmware upgrade
    g. Data transfer Cable glands: M 16 x 1.5, 4 total, with screw plug
    h. Power output: 6.5W
    i. Controller shall use a menu-driven operating system.
    j. Each universal controller shall control 1 to 4 sensors.
3. Model DIQ/JB module
    a. 7 passive terminal strips
    b. Cable glands: M 16 x 1.5, 4 total, with screw plug
4. SNCIQ sensor cable.
    a. 3-conductor shielded cable: communications, power, shield
    b. Conductors: Minimum 18 AWG
    c. Power supply: low voltage (24 V)

2.03 MATERIALS

A. Terminal/controller.
    1. Housing material: polycarbonate, 20% glass filled
    2. Function keys: silicon
    3. EMI/RFI conformance
        a. EN 61326 Class B
        b. FCC Class A
    4. Safety
        a. Certification: CE, cETLus

5. Protection rating: IP66
6. 3-year warranty

B. Expansion modules
1. Housing material: polycarbonate, 20% glass filled
2. EMI/RFI conformance
   a. EN 61326 Class B
   b. FCC Class A
3. Safety
   a. Certification: CE, cETLus
4. Protection rating: IP66
5. 3-year warranty

C. SNCIQ sensor cable.
1. Conductors: copper
2. Cable sheath: PUR
3. Protection rating: IP68 (waterproof)
4. Warranty: 12 months

2.04 ACCESSORIES

A. Sun shield:
1. YSI model 109 295Y sun shield

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install universal controllers and expansion modules in strict accordance with the manufacturer's instructions and recommendations.

B. Network cable
1. Bend radius
   a. Permanent bend: not less than 3.2 in. (80 mm).
   b. One-time bend: not less than 2 in. (50 mm).

3.02 DEMONSTRATION AND TRAINING

A. Manufacturer's representative will include a half-day of training, if requested, for the process monitoring system inclusive of the equipment supplied in this section and Section 40 95 23 Process Monitoring System expansion Modules and sections specifying primary process measurement devices.
1. Contractor will schedule a date and time for start-up.
2. Contractor will require representatives of the following be present during the start-up:
   a. General contractor
   b. Electrical contractor
   c. YSI factory-trained representative
   d. Owner's personnel
   e. Engineer

END OF SECTION

SECTION 44 40 00
GRAVITY THICKENER EQUIPMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Work under this Section includes the furnishing of all labor, materials, tools, equipment and incidentals required and the installation, start-up, testing and operator training for one (1) gravity sludge thickener as indicated on the Drawings and specified herein.

B. The sludge collector mechanism, full radius access bridge assembly with platform, torque tube, scraper arms and pickets, full bridge drive assembly, accessories, spare parts, FRP weirs shall be furnished by a single supplier having overall responsibility for installation, startup, testing and performance.

C. Contractor shall coordinate the design and installation of gravity thickener equipment with a covering system.

D. Related work specified elsewhere includes:
   1. Section 03 30 00 - Cast-in-Place Concrete
   2. Section 03 62 00 -Grout
   3. Section 05 50 00 - Metal Fabrication
   4. Section 05 52 13 - Pipe and Tube Railing
   5. Section 09 96 00 - High Performance Coatings
   6. Division 40 91 23 - Instrumentation and Controls
   7. Section 40 20 00 – Liquids Process Piping
   8. Division 26 - Electrical

E. Work shall include all necessary isolation, contact points and interface devices for proper signal connection to permit proper control, monitoring and operation by the plant SCADA system.

1.03 QUALITY ASSURANCE

A. Furnish the services of a competent field representative of the manufacturer to inspect the final installation, to test all components, and perform the initial start-up and acceptance tests.

B. The product specified herein shall be furnished by a manufacturer who is regularly engaged in the manufacturing and production of such products designed for use in wastewater treatment, and having not less than 10 years' experience in supplying the specified product. Products which do not meet the 10 year experience period will be considered if the product supplier or manufacturer provides a bond or cash deposit, commencing on the date of product acceptance by the Owner until 10 years from the date of substantial completion, which will guarantee replacement of that product in the event of failure in accordance with the guarantee requirements specified herein.

C. Equipment substitutions shall be in accordance with the requirements of Section 01 26 00. Any redesign of the Work required as a result of the proposed substitution shall be completed at no additional cost to the Owner and as approved by the Engineer.

D. It is the intention of this specification to cover minimum acceptable quality for a complete installation with the exception of the motor controls, electrical work and piping requirements.

1.04 SUBMITTALS

A. Submit, in accordance with Section 01 30 00, copies of all materials required to establish compliance with this Section. Submittals shall include the following:

1. Certified shop and installation drawings, catalog cuts, and other technical data showing all details of construction, dimensions and anchor bolt locations.
2. Manufacturer's/Supplier's Certificate of Compliance.
3. Complete master wiring diagrams, elementary or control schematics, and suitable outline drawings showing such details as are necessary to locate conduit stub-ups and field wiring.
4. Manufacturer's recommended installation instructions.
5. A list of the manufacturer’s recommended spare parts to be supplied in addition to those specified in this Section, with the manufacturer’s current price for each item.
6. Complete operating and maintenance manuals shall be furnished for all equipment as provided in Section 01782. The instructions shall be prepared specifically for this installation and shall include all required cuts, drawings, equipment lists, descriptions that are required to instruct operation and maintenance personnel unfamiliar with such equipment. The maintenance instructions shall include trouble shooting data and full preventative maintenance schedules.
7. Manufacturer's written guarantee.
8. Descriptive information shall include the following:
    a. List of ten (10) installations of equipment in successful operation of the design in all essential regards as specified.
    b. Field dye performance data verifying the proposed header design proportionately removes sludge from the entire tank bottom. Test site and testing laboratory shall be identified along with test methods and apparatus used. Data shall be from an existing multiple orifice system incorporating a tapered header.
    c. Written certification that proposed drive(s) meet AGMA standards. Drive mechanism calculations prepared by a registered professional engineer shall be submitted for approval along with published torque value of the proposed

1.05 GUARANTEE

A. For a period of minimum of one (1) year from date of substantial completion, manufacturer shall repair or replace, at no additional cost to the Owner, any equipment which 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 include the cost of materials and installation. This paragraph is not intended to void any manufacturer's guarantee or warranties which might be of a duration greater than 1 year.

1.06 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM)

B. American National Standards Institute (ANSI)

C. American Institute of Steel Construction (AISC)

D. American Iron and Steel Institute (AISI)

E. American Gear Manufacturers Association (AGMA)

F. American Bearing Manufacturers Association (ABMA)

G. National Electrical Manufacturers Association (NEMA)

H. American Welding Society (AWS)

I. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

PART 2 - PRODUCTS

2.01 GENERAL

A. Gravity thickener equipment shall be Model “FT” as manufactured by Amwell.

B. The thickener mechanism shall be of the center drive type, bridge support, with the flow entering from side wall. The thickener shall be designed to remove thickened sludge from the bottom of the tank.

C. This specification covers the general requirements for the design, fabrication and installation of one (1) gravity thickener in a 30-foot diameter concrete tank.

D. Work and components for the gravity thickener include, but are not limited to the following:
   1. Gravity Thickener:
      a. Drive mechanism complete with reducer, motor, and overload device.
      b. Torque tube
      c. Scraper arms with pickets
      d. Influent feedwell with support beams
      e. Access bridge including center platform, handrails and toe plate.
      f. Hopper Scraper
      g. Associated attachment bolts and anchor bolts for above.

2.02 GRAVITY THICKENER

A. General
   1. Design and Performance Requirements
      a. Thickener diameter: 30 feet
      b. Tank side water depth is 14.25 feet.
      c. The thickened sludge collector shall be of sufficient strength and have sufficient mechanical ability to operate in a thickened sludge averaging a 2-3% solid content
      d. Rotational Speed: 8 to 10 feet/minute
      e. The equipment shall be designed to operate without damage when the gravity thickener is empty.
      f. Operating temperature range: 40 to 110 °F
   2. Gravity Thickener Mechanism
      a. The gravity thickener mechanism shall be bridge-supported with side feed and peripheral overflow. The drive mechanism shall support and rotate a torque tube to

which is attached two (2) structural steel rake arms. The structural steel bridge shall span the tank diameter and shall support the entire thickener mechanism. The mechanism shall be designed so there shall be no field welding required, except for the bridge splice, as applicable.

B. Drive Mechanism

1. General

a. The gear drive unit shall be designed in strict conformance with the following standards (latest edition) for 24-hour continuous, uniform load duty and 20-year design gear life:

1) ANSI/AGMA 6034-B92, "Practice for Enclosed Cylindrical Wormgear Speed Reducers and Gearmotors."

b. The drive shall be designed and rated to the following torque ratings (basedon a sludge loading of 50 pounds per diameter foot):

Operating Condition	Torque Foot-Pounds	
Continuous	9,000	24 hours a day
Alarm	9,000	100% of continuous
Motor Cut-off	10,800	120% of continuous
Shear Pin Failure	13,900	150% of continuous
Momentary Peak	18,000	200% of continuous

c. All bearings shall be rated for a minimum L10 life of 50 years based on continuous torque.

d. All gearbox bearings shall be of the anti-friction type running in oil in a cast iron housing.

e. Drive mechanism consisting of primary and final gear reduction unit. The drive and all related electrical components shall be rated for Class 1, Division 2 Group C and D environments.

f. Fabricated steel housings, exposed gearing and submerged bearings shall not be acceptable.

2. Primary Gear Reduction Unit

a. The primary gear reduction unit shall consist of a totally enclosed, horizontal type gear motor, or gear reducer with C-face mounted drive motor, mounted on top of the intermediate worm gear housing.

b. The primary gear reducer shall be a heavy-duty parallel shaft helical type, conforming to ANSI/AGMA 6019-B89, and shall have a service factor of 1.4, based upon the specified continuous running torque.

c. The motor shall be 1.0 horsepower, explosion proof, 1.15 service factor for 460 VAC, 3-phase, 60-hertz power supply.

d. The motor shall be directly connected to the reducer and mounted as recommended by the manufacturer.

3. Chain Drive
   a. Power transmission between the primary gear reduction unit and the intermediate worm gear reduction unit shall be through a steel roller chain and steel sprocket assembly.

   b. The chain drive shall be enclosed with a stainless-steel chain guard meeting OSHA requirement.

   c. The shear pin overload shall be easily accessible by removal of the chain guard.

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4. Intermediate Worm Gear Reduction Unit
   a. The intermediate worm gear reduction unit shall consist of a worm gear driven by an integral straddle mounted worm and shaft, supported by heavy duty anti-friction bearings.

   b. The integral worm and shaft shall be single piece and made from AISI 8620Halloy steel carburized, hardened and ground and shall have a case hardness of 55-60 RC. The worm gear shall be centrifugally cast, conforming to ASTMB271 and ANSI/AGMA 2004-B89, high strength, manganese bronze.

   c. The worm gear shall have a minimum 200 Brinell hardness and shall have a minimum pitch diameter of 16.50 and have a minimum face width of 2.75. The worm gear shall be keyed to the pinion shaft. The intermediate worm gear housing shall have full 360° contact and support from the final gear housing.

5. In addition to a mechanical shear pin sprocket, the drive assembly shall also include two (2) NEMA 7 limit switches located on the worm gear housing and operated by a spring loaded actuator and aluminum pivot arm from the worm shaft. One (1) limit switch (N.O. contact) is for alarm torque and one (1) limit switch (N.C. contact) is for cut-out torque. An aluminum pointer with aluminum graduated scale marked in 0, 25, 50, 75 and 100 percentages are provided for indicating load on drive at all times.

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6. Final Reduction

a. The final reduction worm gear shall be a cut-tooth casting mounted on a replaceable four-point contact ball bearings assembly. The bearing shall be mounted in a housing of high strength cast iron.
b. The housing shall be provided with an extended journal type torque tube steady bearing to prevent tipping of the gear. The final reduction gear and the anti-friction ball bearings shall run in an oil bath within the final gear reduction housing. The housing shall be effectively sealed against contaminants by a felt strip. A readily accessible oil filling and level pipe with sight gauge shall be furnished.
c. A steel torque tube shall be bolted to the gear and supports the scraper mechanism.
d. Provide worm gear speed reduction with grease and oil lubricated anti-friction type bearings in cast iron housing securely bolted on the machined top face of the final reduction unit. Worm and shaft shall be a two-piece assembly for ease of maintenance. Cycloidal and planetary gearing shall not be acceptable.
e. Align and maintain accurate centers with the final reduction gearing. Swivel base mounting of the intermediate unit shall not be acceptable.
f. Mount an electro-mechanical overload device on the thrust end of the worm shaft consisting of plate spring assembly, plunger, indicator dial, two (2) microswitches (one N.O. and one N.C.) and a terminal block, all enclosed in a weather tight, gray cast iron housing. Amperage metering devices shall not be considered equal to the overload device specified.
g. Microswitches shall be factory set to: (1) sound an alarm when the load on the mechanism reaches 100% of the AGMA torque; and (2) stop the motor when the load reaches 120% of the AGMA torque.
h. Provide a shear pin device, set for 140% of the AGMA torque mounted on the drive end of the worm shaft.

C. Torque Tube
1. The steel center torque tube shall be an 8” SCH 40 fabricated from minimum 1/4" wall pipe construction or solid shafting designed to support the weight of the suspended structure and to withstand the cutout torque of the drive. A sludge concentrator shall be fabricated steel, attached to the bottom of the torque tube at 90º to the collector arms.

D. Sludge Rake Arms
1. Each thickener mechanism shall be furnished with two (2) fabricated structural steel arms of truss construction conforming to the slope of the tank floor.

2. The arms shall be rigidly connected to the torque tube and equipped with steel angle pickets spaced at 2 feet intervals for thickening.

3. Each arm shall be furnished with steel flights complete with adjustable springbrass squeegee blades. The blades shall be set identically for each arm andshall scrape the settled sludge along the tank bottom to the sludge draw off hopper at the center of the tank. The flights shall be arranged to sweep the floor twice per revolution.

E. Influent Well

1. The influent well shall be manufactured of 3/16-inch thick steel plate with necessary stiffening members and shall be provided with baffled port openings at the water surface to direct any floating material out of the well and to the surface skimmer. The influent well shall be supported by parallel channels supported on the tank walls which span the basin. A steel baffle shall be provided on the inside of the influent well to divert the flow in opposite horizontal directions.

2. The influent well shall be 6-feet diameter and shall project at least 4'-0" deep. A flange connection to match the influent pipe shall be furnished for field welding to the influent well. The 12" diameter influent pipe supplied by the general contractor. The influent pipe shall be supported independently of the influent well.

F. Walkway and Platform

1. Walkway: Provide one (1) full radius welded steel minimum 3 feet wide walkway and center drive platform with handrails for access to the drive mechanism. The walkway shall be supported by the tank walls on both ends and shall be designed to safely withstand a live load of 50 pounds per square foot. Deflection shall not exceed L/360 when both the dead load and live loads are applied. It shall consist of two trusses or beams (minimum W14 x 22) with minimum 1 1/4" thick aluminum I-bar grating between the trusses or beams just beyond the center of the tank. The walkway shall be diagonally braced against lateral movement, and provided with handrails 42" high, of double row 1 1/2" diameter horizontal aluminum pipe, and 1/4" x 4" high toe plates on both sides of the walkway. The bridge shall be cambered as required to compensate for both the live and dead loads.

2. Stainless steel bearing plates, UHMW-PE slide plates, and anchor bolts for the wall support shall be provided by the equipment manufacturer and installed by the contractor. Bearing plate dimensions and anchor bolt diameter, length, quantity, and arrangement shall be per the equipment manufacturer.

3. Center Drive Platform: Provide a center drive platform with 24" clearance outside the center drive components. It shall consist of 1/4" aluminum checkered plate or 1-1/4" aluminum grating with necessary stiffeners and supports, resting on the drive unit and, and provided with connections to the walkway. The entire platform shall be surrounded by handrails 42" high of double-row 1-1/2" diameter horizontal aluminum pipe with 1/4" x 4" high toe plates. The platform shall be a minimum 8 foot long and 8 feet wide.

G. Effluent Weirs

1. Effluent weir plates shall consist of 6-inch deep x 1/4 -inch thick FRP sections with notches at 6 inch intervals.

2. The weir section shall be fastened to the tank wall using Type 316 stainless steel expansion anchor bolts, hex nuts and 5 inch diameter FRP washers, allowing for vertical adjustment.

3. To prevent leakage, all surface between the launder walls and weir plates shall be given a seal coat of suitable mastic provided by the contractor.
4. Equipment manufacturer shall furnish steel template and grout shield to accurately locate center pier anchors and allow for grouting beneath the pier and manifold seal plate after final plumbing.

H. Factory Finish
   1. All fabricated steel surfaces that require painting shall be cleaned in accordance with SSPC- SP10 latest revision, shop primed with Sherwin-Williams coatings to a minimum 3-5 mils DFT. Final field coats will be applied by the contractor
   2. Motor and speed reducers shall be painted with the Manufacturer's standard finish paint.

I. Name Plate
   1. The equipment specified in this Section shall be furnished with a nameplate

PART 3 - EXECUTION

3.01 INSPECTION

A. Before installation, inspect and verify that the Work is complete and correct to the point where this installation may properly commence.

B. Do not proceed with installations until conditions are satisfactory.

3.02 INSTALLATION

A. Install the equipment in strict conformance with the Manufacturer's installation instructions, approved Shop Drawings, and pre-installation checklist.

B. No modifications to equipment shall be made without prior written consent of the Manufacturer and approval of Engineer.

C. Verify all dimensions and elevations prior to installing equipment. Notify Engineer and the Manufacturer of specific differences.

D. Furnish all necessary materials (including lubricants, chemicals, etc.) and equipment (including measuring devices, etc.) for testing and startup.

E. Perform surface preparation and field painting of equipment in accordance with requirements specified in Section 099600.

F. Isolate dissimilar metals by back-painting or with dielectric using stainless steel fasteners.

G. Anchor bolts and nuts shall be Type 316 stainless steel.

3.03 ADJUST AND CLEAN

A. Make adjustments required to provide for proper and satisfactory operation, free from vibrations and noise.

B. Upon the satisfactory completion of tests and adjustments, clean equipment of dirt and foreign matter.

C. Shop prime and paint all surfaces of the Work in accordance with Section 099600 – High Performance Coatings.

3.04 MANUFACTURER'S SERVICES

A. Provide the services of the equipment manufacturer's factory-trained service engineer for sufficient time to assure the proper installation of the equipment and services as required to assist in start-up, calibration and testing.

B. Schedule service trips and notify the Engineer a minimum of 72 hours prior to arrival of the factory service representative. All such days shall be at times acceptable to the Owner.

C. Minimum time requirements for the thickener shall consist of the following, travel time excluded.
   1. One day to provide installation and inspection instructions, perform equipment testing, calibration, and start-up, and to instruct Owner in proper operation and maintenance procedures and requirements.
   2. One day during the guarantee period to recheck the system, to recalibrate and adjust equipment, answer Owner's questions, and review operation and maintenance procedures.
   3. Times specified above are exclusive of travel time to and from facility and do not relieve the manufacturer from providing sufficient services to place equipment in satisfactory operation.

D. Installation Assistance
   1. Provide for installation assistance for the equipment supplied with the minimum requirements including:
      a. Pre-grout inspection
      b. Final check-out of equipment after installation

E. Startup services and training of Owner's personnel shall be at such times a requested by the Owner.

F. Additional service times requested by the Contractor or required due to the mechanism not being fully operational at the time of inspection, certification or testing shall be at no additional cost to the Owner.

3.05 STARTUP AND TESTING

A. Prior to start-up, clean the construction area by removing construction debris and foreign material.

B. Contractor shall furnish the services of manufacturer's factory-trained service representative to inspect the completed installation, calibrate and adjust instrumentation, and correct or supervise correction of defects or malfunctions, and participate in start-up. Start-up shall be minimum 8 hours (one man for one (1) day excluding travel timing).

C. The manufacturer's service representative shall approve the installation prior to initial start-up.

D. The system shall be field tested as a whole system, witnessed by the manufacturer's service representative, Engineer and Owner. Contractor and Engineer to verify operation under field conditions. Testing of the system shall demonstrate that the equipment is fully operational.

E. Contractor shall also furnish the oil and grease for initial operation. The grades of oil and grease shall be in compliance with the Manufacturer's recommendations.

3.06 TRAINING

A. Contractor shall furnish the services of Manufacturer's qualified, factory-trained operations and maintenance technician to instruct and train Owner's personnel in the proper care, operation, and maintenance of the equipment. These services shall be in addition to the services specified under Article 3.05 above.

B. One (1) training session is required. Training shall be completed after start-up services have been performed. Training shall be a minimum of four (4) hours (excluding travel time) and shall occur not less than two (2) weeks after the start-up of the equipment. Time, location, and duration of all training sessions shall be coordinated with Owner's personnel.

C. Each session shall include, but not be limited to, the following topics:
   1. Equipment design and theory of operation.
   2. Controls and modes of operation.
   3. Proper operation and maintenance of equipment.
   4. Troubleshooting and problem identification.
   5. Safety precautions/practices.
   6. Equipment manual review.
   7. Warranty/repair service information.

END OF SECTION

SECTION 44 40 10
GRAVITY THICKENER COVER

PART 1 - GENERAL

1.01 SUMMARY

A. Scope of Work
   1. This specification shall govern all work necessary to furnish and install a flat fiberglass cover, including all anchorage hardware required for proper installation of the tank cover.

1.02 DESIGN CONSIDERATIONS

A. The covers shall be self-supporting. The configuration shall be either of two designs:
   1. If clearance below the cover is not a concern, separate panels and beams shall be used in conjunction with stainless steel supports, if needed.
   2. If clearance below cover is a concern; structural members shall rest on the tank wall. Plank span (beam spacing) will be determined from calculations based on site conditions and specified loading. Access hatches and accessories provided as needed shall be of similar fiberglass material.

B. The covers shall be “Composi Cover™” as manufactured by Fiberglass Fabricators, Inc.

1.03 RELATED SECTIONS

A. As required for specific project.

1.04 REFERENCES

A. Applicable sections of the following standards shall apply to the fiberglass covers as indicated in this specification:

B. ANSI/ASCE 7-10 "Minimum Design Loads for Buildings and Other Structures"

C. ANSI/AWWA-F102-91 Section 5 "Standard Recommended Practice for Classifying Visual Defects in Glass Reinforced Laminates"

1.05 SUBMITTALS

A. Submit, in accordance with Section 01 33 00, copies of all materials required to establish compliance with this Section. Submittals shall include the following:
   1. Certified shop and installation drawings, catalog cuts, and other technical data showing all details of construction, dimensions and anchor bolt locations.
   2. Manufacturer's/Supplier's Certificate of Compliance.
   3. Complete master wiring diagrams, elementary or control schematics, and suitable outline drawings showing such details as are necessary to locate conduit stub-ups and field wiring.
   4. Manufacturer's recommended installation instructions.
   5. A list of the manufacturer’s recommended spare parts to be supplied in addition to those specified in this Section, with the manufacturer’s current price for each item.
   6. Complete operating and maintenance manuals shall be furnished for all equipment as provided in Section 01782. The instructions shall be prepared specifically for this installation and shall include all required cuts, drawings, equipment lists, descriptions that are required to instruct operation and maintenance personnel unfamiliar with such

equipment. The maintenance instructions shall include trouble shooting data and full preventative maintenance schedules.

7. Manufacturer's written guarantee.
8. Descriptive information shall include the following:
   a. List of ten (10) installations of equipment in successful operation of the design in all essential regards as specified.

b. Field dye performance data verifying the proposed header design proportionately removes sludge from the entire tank bottom. Test site and testing laboratory shall be identified along with test methods and apparatus used. Data shall be from an existing multiple orifice system incorporating a tapered header.
c. Written certification that proposed drive(s) meet AGMA standards. Drive mechanism calculations prepared by a registered professional engineer shall be submitted for approval along with published torque value of the proposed.

1.06. QUALITY ASSURANCE

A. QUALIFICATIONS

1. Flat cover manufacturer must have a minimum of five (5) years history of successful installations of similar size. Past job list with customer contact information will be required. Subject to compliance with requirements, manufacturers offering products which may be incorporated are limited to: Fiberglass Fabricators Inc. of Smithfield, RI.

B. MANUFACTURER'S QUALITY CONTROL

1. All fabrication shall be carefully inspected at the site of fabrication by factory inspectors who shall use whatever means necessary to assure the proper fit of all field connections and compliance with all material and fabrication requirements of the specifications.

1.07 WARRANTY

C. General warranty of the fabricated Flat Cover for materials and workmanship shall be for a minimum of one (1) year after installation with a maximum of eighteen (18) months from date of shipment.

D. The contractor shall be responsible for verifying all field dimensions to develop and approve shop drawings.

PART 2 - PRODUCTS

2.01 MATERIALS GENERAL

A. All materials shall be new and shall be specially designed or selected for the function and service specified. No material may be used in the project that has not been approved by the engineer. Approval for incorporation into the project will be made only after the review of shop drawings and specifications.

B. With the exception of beam clips, all structural components shall be FRP pultruded material. Beams base mounting clips may also be 316 SS if necessitated by design requirements.

C. Standard color shall be gray.

D. Cut edges or drilled holes shall be deburred and sealed with paraffinated resin solution.

E. Gasketing for panel joints shall be EPDM sponge.

2.02 SYSTEM DESCRIPTION

A. Design Requirements
1. Cover shall be designed in accordance with ANSI/ASCE 7-10 for the designated area:
2. Environmental load: 30 psf minimum (or designated area data per ANSI/ASCE 7-10) with an L/180
3. Personnel load: 250 lbs. in 12" square with an L/240.

4. Wind load: 90 mph minimum (or designated area data per ANSI/ASCE 7-10)
5. Snow load: The value of the snow load shall be as calculated in accordance with ANSI/ASCE 7-10 for the designated area.
6. Seismic zone requirements per ANSI/ASCE 7-10 for the designated area.
7. Design safety factor of 4:1 for allowable stresses shall be met for all load combinations.
8. Horizontal loads shall be contained by both support structures and panel sections.
9. The design and installation shall incorporate provisions for thermal expansion and contraction over an ambient air temperature range of -30 to 1200F.

2.03 RESIN REQUIREMENTS

A. The resin shall be corrosion-resistant Isophthalic polyester, which has been determined to be acceptable for the service conditions. Ultraviolet-light stabilizer shall be added to the laminate.

B. When used in chemical storage, containment, or processing areas, a premium grade vinyl ester resin system shall be used to provide chemical resistance, strength, and other physical properties as required. UV inhibitors shall be added to the laminate.

2.04 MATERIAL PHYSICAL PROPERTIES (MINIMUM)

A. Laminate Minimum Physical Properties – Pultruded FRP

Property @ 70ºF	Value	Test Method
Tensile Strength - plank 3" thk.	31,100 psi	ASTM D 638
Tensile Strength - plank 2" thk.	30,000 psi	ASTM D 638
Tensile Strength - structurals	30,000 psi	ASTM D 638
Tensile Modulus - plank 3" thk.	2,486,000 psi	ASTM D 638
Tensile Modulus - plank 2" thk.	3,000,000 psi	ASTM D 638
Tensile Modulus - structurals	2,500,000 psi	ASTM D 638
Compressive Strength - structurals	30,000 psi	ASTM D 695
Compressive Modulus - structurals	2,500,000 psi	ASTM D 695
Flexural Strength - plank 3" thk.	24,500 psi	ASTM D 790
Flexural Strength - structurals	30,000 psi	ASTM D 790
Flexural Modulus - plank 3" thk.	885,000 psi	ASTM D 790
Flexural Modulus - structurals	1,600,000 psi	ASTM D 790
Modulus Elasticity - structurals	2,500,000 psi	Full Section
Shear Strength - plank 3" thk.	3190 psi	ASTM D 2344
Shear Strength - plank 2" thk.	4,500 psi	ASTM D 2344
Shear Strength - structurals	4,500 psi	ASTM D 2344
Shear Modulus - structurals	425,000 psi	-
Barcol Hardness	45	ASTM D 2583
Glass Content	45%	ASTM D 2584
Water Absorption	.6% Max	ASTM D 570
Coefficient of Linear Thermal Expansion (in/in/°F)	7×10^{-6}	ASTM D 696

B. Laminate Minimum Physical Properties – HLU FRP

Property @ 70 deg.F	Value	Test Method
Tensile Strength	30,467 psi	ASTM D 638
Tensile Modulus	2,050,000 psi	ASTM D 638
Flexural Strength	35,984 psi	ASTM D 790
Flexural Modulus	1,476,000 psi	ASTM D 790
Compressive Strength	27,496 psi	ASTM D 695
Compressive Modulus	3,372,000 psi	ASTM D 695
Shear Strength	13,442 psi	ASTM D 5379
Shear Modulus	573,800 psi	ASTM D 5379
Glass Content	50.6 %	ASTM D2584
Barcol Hardness	50	ASTM D 2583
Izod Impact Strength	37.1 ft-lb/in	ASTM D256
Water Absorption	.09% Max	ASTM D 570
Density	.059 lb/in^3	ASTM D 792
Coefficient of Linear Thermal Expansion (in/in/□F)	1.18 x 10^{-5}	ASTM D 696

PART 3 - EXECUTION

3.01 FINAL APPROVAL

A. Final approval for incorporation into the project will be made only after the review of shop drawings, specifications, and data as follows:
   1. Shop drawings shall be complete with all dimensions, anchor locations, details of connecting piping and the size and locations of any required openings.
   2. Specifications for all components shall be provided.
   3. Details of the major fabricated components showing the arrangement of components and labeled with component sizes and materials of construction shall be submitted.
   4. Structural design calculations for all components shall be submitted.
   5. Manufacturer's recommended procedures for job site storage of equipment, handling, and erection shall be submitted.

3.02 DESIGN CALCULATIONS

A. As part of the shop drawings for the cover components, the fabricator shall supply any and all analyses pertinent to the composite design. The calculations shall include standard strength of materials approaches and computerized finite element analyses of sections where conventional methods do not apply. Furthermore, for the calculated loads, a complete laminate analysis shall be submitted identifying the various factors of safety for the proposed laminate schedule. Factors of safety shall be evaluated accordingly.

B. The evaluation of deflection and stresses on panel sections under uniform loading shall incorporate numerical analysis calculations.

C. The calculations shall fully consider the access hatches same as planking.

D. A written narrative that clearly states all of the basic design assumptions and parameters shall accompany the computerized calculations.

E. Approval by the engineer shall not relieve the manufacturer of responsibility for providing materials and design conforming to the intent of these specifications.

F. Complete structural design calculations and drawings shall be submitted as required herein. Design calculations and drawings must be approved and stamped by a registered Professional Engineer in the State of installation.

3.03 FABRICATION

A. If required, provisions shall be made to provide adequate drainage of water from cover.

B. The installation contractor shall confirm all field measurements with the approved flat cover fabrication drawing before fabrication is initiated.

3.04 SHOP ASSEMBLY

A. The manufacturer shall pre-assemble a minimum of three (3) equal cover segments to a full scale layout to insure proper fit and assembly. If cover consists of less than (3) equal segments, the manufacturer shall pre-assemble the cover in its entirety.

B. Fiberglass cutouts from cover segments shall be identified and shipped with cover. Cutouts will be used by the engineer to determine proper thickness, glass content and laminate sequence.

C. Assembly of panel segments will be such as to allow all bolting to be performed from the exterior of cover.

D. Anchor bolts, assembly hardware, rail nut plates, hinges and lock sets shall be type 316 stainless steel.

3.05 MATERIALS, EQUIPMENT, AND COMPONENTS

A. Products of:

Fiberglass Fabricators, Incorporated
P.O. Box 17068
964 Douglas Pike
Smithfield, RI 02917
(P) 401-231-3552
(F) 401-232-2260

3.06 INSTALLATION, STORAGE, HANDLING, AND MAINTENANCE

A. WRITTEN INSTRUCTIONS

1. The manufacturer shall provide detailed written instructions for the installation, long term storage, handling, and maintenance for the products provided.

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