

**THE TOWN OF MONTVILLE
NEW LONDON COUNTY, CONNECTICUT**

**PROJECT MANUAL
FOR**

WWTF HEADWORKS IMPROVEMENTS PROJECT

MONTVILLE, CONNECTICUT

CONTRACT NO. 2021-5

BID DATE: March 15, 2021

ISSUED FOR BIDDING

March, 2021

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GEOTECHNICAL INVESTIGATION
PROPOSED HEADWORKS
BUILDING AND GRIT CHAMBER

WASTE WATER TREATMENT PLANT
TOWN OF MONTVILLE, CONNECTICUT

1BY URS CORPORATION
DATED MAY 1, 2012

END OF SECTION

DIVISION 0
REQUIREMENTS AND CONDITIONS

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THE TOWN OF MONTVILLE, CT
WWTF HEADWORKS IMPROVEMENT PROJECT
CONTRACT NUMBER 2021-5

INVITATION TO BID

Sealed Bids for construction of Contract Number 2021-5: WWTF Headworks Improvement Project: will be received by the Town of Montville Finance Department located at 310 Norwich-New London Turnpike, Uncasville, CT 06382 until 10:00 AM May 7, 2021. At that time Proposals will be opened and read aloud in the Town Council Chambers, and interested persons may attend the opening remotely under procedures that will be posted on the Town of Montville's website.

Because of closure due to Covid-19, a sealed bids may be delivered by regular or overnight mail to: Town of Montville - Attn Finance Office, 310 Norwich-New London Turnpike, Uncasville, CT 06382. Bids may also be placed in the drop box outside the Town Hall at address listed above. Bids shall be submitted with one hard copy original and one photocopy of all documents. Each Bid shall be submitted in a sealed opaque envelope bearing on the outside the Bidder's name, address, and the Project Title for which the Bid is submitted. (If forwarded by mail, Bid and sealed envelope marked as described above shall be enclosed in another envelope with the notation "BID ENCLOSED" on the face)

The Work shall include, but not be limited to, all labor, equipment and material necessary for the construction of a new grit separator and tank and connection to effluent piping, modification to existing headworks building including a classifier with modifications to the plant water system, traffic management and control during construction, and all other appurtenant work and cleanup necessary for completion of this project. The Work shall be located in the Town of Montville, Connecticut as shown on the Drawings and specified herein.

Contract Documents may be obtained at the Town of Montville website, www.montville-ct.org.

Each Bid shall be submitted in accordance with the Instructions to Bidders and shall be accompanied by a Bid Security in the amount of fifteen (15) percent of the Bid.

Bidders may not withdraw their Bids for a period of ONE HUNDRED TWENTY (120) days, excluding Saturdays, Sundays, and legal holidays after the actual date of the opening of the Bids.

The Successful Bidder must furnish a 100 percent Performance Bond and a 100 percent Payment Bond with a surety company acceptable to the Owner.

The Successful Bidder will be required to submit all copies of the Agreement and all other applicable Contract Documents within Ten (10) days of the Notice of Award as outlined in the Contract Document. Complete instructions for filing Bids are included in the Instructions to Bidders.

Wage rates for this Project are subject to the minimum and prevailing wage rates as per The State of Connecticut.

The Owner reserves the right to waive any informality in or to reject any or all Bids if deemed to be in its best interest.

Bidders shall certify that they do not, and will not, maintain or provide for their employees any facility that is segregated on a basis of race, color, creed, or national origin.

All Bidders are requested to note that the award of this contract is subject to the following conditions and contingencies:

1. The approval of such governmental agencies as may be required by law.
2. The appropriation of adequate funds, by the proper agencies

The Bidder shall hold a current DAS Contractor Prequalification Certificate in SEWER AND WATER LINES from the Department of Administrative Services of the State of Connecticut according to C.G.S. § 4a-100, C.G.S. § 4b-101 and C.G.S. § 4b-91. Bidders shall submit with their Bids their DAS Contractor Prequalification Certificate along with a current Update Bid Statement. In addition, any named Subcontractor whose subcontract value is equal to or greater than \$500,000 shall hold a current DAS Contractor Prequalification Certificate in the closest applicable Classification of the work that the Subcontractor will complete in the contract. The bidder must submit with their bid, all applicable Subcontractor DAS Prequalification certificates. Any Bid submitted without a copy of the DAS Prequalification Certificate and an Update Bid Statement for the bidder and DAS Prequalification Certificates for Subcontractors whose subcontract value is equal to or greater than \$500,000 shall be invalid.

Since MBE/WBE Subcontractors are not required to be named at bid submission, Bidders do not need to include MBE/WBE Subcontractor Prequalification Certificates with their bids. However, as to proposed MBE/WBE Subcontractors whose subcontract value is equal to or greater than \$500,000, the DAS Contractor Prequalification Certificate is not required with the bid, but within 30 days of the notification of designation as the apparent low bidder, the apparent low bidder shall submit to the Owner a current DAS Contractor Prequalification Certificate in each appropriate work classification for each such MBE/WBE Subcontractor. Bidders do not need to include MBE/WBE Subcontractor Prequalification Certificates with their bids.

The Successful Bidder and each of its Subcontractors having subcontracts in value equal to or greater than \$500,000 shall maintain and keep current their respective DAS Contractor Prequalification Certificates at all times during the term of the Contract and any warranty period set forth in the Contract Documents.

A pre-bid conference will be held at 9:00 AM, March 23, 2021 via Zoom accessible at the following link, <https://zoom.us/j/93655411194?pwd=VEZPRHpPdIZuUXdzSXpEN0VXSXpFQT09>, or by phone at +1 646 558 8656. Meeting ID: 5541 1194, Pass Code 716201

A non-mandatory site walk will be held at the Water Pollution Control Facility, 83 Pink Row, Uncasville, CT, on March 26, 2021 at 10:00 AM. All prospective bidders are invited to ask questions to the Municipality and/or the Municipality's Agent(s) during this conference. All questions about the meaning or intent of the Contract Documents shall be received in writing (hardcopy or fax) to the ENGINEER no later than 4:00 PM, April 9, 2021.

Prospective bidders attending the site walk will be required to follow all current WPCA, local, state and federal guidelines for the prevention of the spread of Covid-19. Individuals will be required to self certify They, do not have a fever and are not experiencing any respiratory symptoms on the CDC's Covid-19 symptom list, have not travelled to any country which has resulted in a government entity instructing them to self-quarantine within the past 14 days, or have been in close contact with in the last 14 days with someone who is experiencing flu-like symptoms All social distancing protocols will be followed with

individuals being required to wear a face covering. Where possible six feet separation of individuals will be maintained.

Direct all inquiries to Matthew Ranando, P.E., Project Manager, Martinez Couch and Associates, LLC, 1084 Cromwell Avenue, Suite 2, Rocky Hill, CT 06067 in writing to mranando@martinezcouch.com or call telephone number direct line:(860) 929-7627 or general office: (860) 436-4364 between the hours of 8:00 a.m. to 4:00 p.m., Monday through Friday, except holidays, fax number (860) 436-4626.

The Contractor who is selected to perform this State project must comply with CONN. GEN. STAT. 4a-60, 4a-60a, 4a-60g. and 46a-68b through 46a-68f, inclusive, as amended by June 2015 Special Session Public Act 15-5.

State law requires a minimum of twenty-five (25%) percent of the state-funded portion of the contract for award to subcontractors holding current certification from the Connecticut Department of Administrative Services (“DAS”) under the provisions of CONN. GEN. STAT. 4a-60g. (25% of the work with DAS certified Small and Minority owned businesses.) The contractor must demonstrate good faith effort to meet the 25% set-aside goals.

For municipal public works contracts and quasi-public agency projects, the contractor must file a written or electronic non-discrimination certification with the Commission on Human Rights and Opportunities. Forms can be found at:

http://www.ct.gov/opm/cwp/view.asp?a=2982&q=390928&opmNav_GID=1806

Non-discrimination in Employment and Labor Standards: Bidders on this work and all subcontractors will be required to comply with the Governor’s Executive Order No. 3 and No. 17 regarding affirmative action and equal employment opportunity, as well as provisions in the Civil Rights Act of 1964, Equal Opportunity Act of 1972, and Executive Orders 11246, 11375, and 11478.

END OF SECTION

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THE TOWN OF MONTVILLE, CT
WWTF HEADWORKS IMPROVEMENT PROJECT
CONTRACT NUMBER 2021-5
INSTRUCTIONS TO BIDDERS

ARTICLE 1. QUALIFICATIONS OF BIDDERS

- 1.1. Bidders may be investigated by OWNER to determine if they are qualified to perform the Work. All Bidders shall be prepared to submit within ten (10) days of OWNER's or ENGINEER's request, written evidence of such information and data necessary to make this determination.
- 1.2. The investigation of a Bidder will seek to determine whether the organization is adequate in size, is authorized to do business in the jurisdiction where the project is located, has had previous experience and whether available equipment and financial resources are adequate to assure OWNER that the Work will be completed in accordance with the terms of the Agreement. The amount of other work to which the Bidder is committed may also be considered.
- 1.3. In evaluating Bids, OWNER will consider the qualifications of only those Bidders whose Bid is in compliance with the prescribed requirements.
- 1.4. OWNER reserves the right to reject any Bid if the evidence submitted by, or the investigation of, such Bidder fails to satisfy OWNER that such Bidder is properly qualified to carry out the obligations of the Contract Documents and to complete the Work contemplated therein.

ARTICLE 2. COPIES OF CONTRACT DOCUMENTS

- 2.1. Complete sets of Contract Documents shall be used in preparing Bids; neither OWNER nor ENGINEER assume any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Contract Documents.
- 2.2. OWNER and ENGINEER in making copies of Contract Documents available do so only for the purpose of obtaining Bids on the Work and do not confer a license or grant for any other use.

ARTICLE 3. EXAMINATION OF CONTRACT DOCUMENTS AND SITE

- 3.1. Before submitting a Bid, each Bidder must (a) examine the Contract Documents thoroughly, (b) visit the site to become familiar with local conditions that may in any manner affect cost, progress or performance of the Work, (c) become familiar with Federal, State and local laws, ordinances, rules and regulations that may in any manner affect cost, progress or performance of the Work; and (d) study and carefully correlate Bidder's observations with the requirements of the Contract Documents.
- 3.2. Before submitting a Bid, Bidders may, at their own expense, make such investigations and tests as they may deem necessary to determine their Bid for performance of the Work in accordance with the time, price and other terms and conditions of the Contract Documents.

- 3.3. On request, will provide each Bidder access to the site to conduct such investigations and tests as each Bidder deems necessary for the submission of a Bid.
- 3.4. The lands upon which the Work is to be performed, rights-of-way for access thereto and other lands designated for use by CONTRACTOR in performing the Work are identified in the Supplementary Conditions, General Requirements or on the Drawings.
- 3.5. The submission of a Bid will constitute an incontrovertible representation that the Bidder has complied with every requirement of this Article 3 and that the Contract Documents are sufficient in scope and detail to indicate and convey understanding of all terms and conditions for performance of the Work.

ARTICLE 4. INTERPRETATIONS

- 4.1. All questions about the meaning or intent of the Contract Documents shall be received in by the OWNER, at least ten days before the date set herein for the opening of bids. To receive consideration, such questions shall be submitted in writing (hardcopy or fax) to the ENGINEER no later than 4:00 PM, April, 9, 2021. Direct all inquiries to Matthew Ranando, P.E., Martinez Couch and Associates, LLC, 1084 Cromwell Avenue, Suite 2, Rocky Hill, CT 06067 or call telephone number direct line:(860) 929-7635 or general office: (860) 436-4364 between the hours of 8:00 a.m. to 4:00 p.m., Monday through Friday, except holidays, fax number (860) 436-4626. The Owner is not responsible for any questions not received by the date and time required. The Owner will neither approve nor disapprove particular products or methods prior to the opening of the bids; such products or methods will be considered when offered by the successful Bidder for incorporation into the work.
- 4.2. Written clarifications or interpretations will be issued by Addenda not later than five days before the bid opening date. Only questions answered by formal written Addenda will be binding. Oral and other clarifications or interpretations will be without legal effect. Addenda will be mailed via certified mail with return receipt requested, to all parties recorded as having received the Contract Documents.
- 4.3. Bidders are responsible for determining that they have received all Addenda issued.
- 4.4. Questions concerning bid submittal, bonding, etc. should be referred to the Town's WPCA at telephone 860-848-3030, Ext. 7 between the hours of 8:00 a.m. to 4:00 p.m., Monday through Friday, except holidays.

ARTICLE 5. PRE-BID CONFERENCE

- 5.1. A pre-bid conference will be held at 9:00 AM, March 23, 2021 via Zoom accessible at the following link, <https://zoom.us/j/93655411194?pwd=VEZPRHpPdIZuUXdzSXpEN0VXSXpFQT09> , or by phone at +1 646 558 8656. Meeting ID: 5541 1194, Pass Code 716201.
- 5.2 A non-mandatory site walk will be held at the Water Pollution Control Facility, 83 Pink Row, Uncasville, CT. on March, 26, 2021 at 10:00 AM to discuss the requirements of the Contract Documents. All prospective bidders are invited to ask questions to the Town and/or the Town's Agent(s) during this conference.
- 5.3 Prospective bidders attending the site walk will be required to follow all current WPCA, local, state and federal guidelines for the prevention of the spread of Covid-19. Individuals will be required

to self certify They, do not have a fever and are not experiencing any respiratory symptoms on the CDC's Covid-19 symptom list, have not travelled to any country which has resulted in a government entity instructing them to self-quarantine within the past 14 days, or have been in close contact with in the last 14 days with someone who is experiencing flu-like symptoms. All social distancing protocols will be followed with individuals being required to wear a face covering. Where possible six feet separation of individuals will be maintained

ARTICLE 6. BID SECURITY

- 6.1. Each Bid must be accompanied by cash, bid bond, or a certified check on, or a treasurer's or cashier's check issued by, a responsible bank or trust company, payable to OWNER. The Bid Security shall be in the amount EQUAL TO FIFTEEN PERCENT (15%) of the amount of the bid. Bid Security shall be sealed in a separate envelope from the Bid and then attached to the envelope containing the Bid. All Bid Securities except those of the three lowest responsible and eligible Bidders will be returned within ten days, Saturdays, Sundays, and legal holidays excluded, after opening of the Bids. All Bid Securities will be returned on the execution of the Agreement or if no award is made, within ONE HUNDRED TWENTY (120) days, excluding Saturdays, Sundays and legal holidays after the actual date of opening of the Bids, unless forfeited under the conditions herein stipulated.
- 6.2. In case a party to whom a Contract is awarded shall fail or neglect to execute the Agreement and furnish the satisfactory bonds within the time specified, OWNER may determine that the Bidder has abandoned the Contract, and thereupon the Bid Forms and acceptance shall be null and void and the Bid Security accompanying the Bid Form shall be forfeited to OWNER as liquidated damages for such failure or neglect and to indemnify said OWNER for any loss which may be sustained by failure of the Bidder to execute the Agreement and furnish the bonds as aforesaid, provided that the amount forfeited to OWNER shall not exceed the difference between the Bid Price of said Bidder and that of the next lowest responsible and eligible bidder and provided further that, in case of death, disability, or other unforeseen circumstances affecting the Bidder, such Bid Security may be returned to the Bidder. After execution of the Agreement and acceptance of the bonds by OWNER, the Bid Security accompanying the Bid Form of the Successful Bidder will be returned.

ARTICLE 7. PERFORMANCE, PAYMENT AND OTHER BONDS

- 7.1. Performance, Payment and other Bonds shall be provided in accordance with Article 5 of the Conditions of the Contract.
- 7.2. All Bonds required as Contract Security shall be furnished with the executed Agreement.

ARTICLE 8. BID FORM

- 8.1. Each bid shall be completed on the Proposal, Document 00300, which shall be unchanged except for the insertion of names, addresses, prices and other required data in the spaces provided on the Proposal form. All blank spaces for Bid prices must be filled in with the unit price for the item or the lump sum for which the Bid is made. Bidders shall also submit the following documents:
 - a. Bid Security (Section 00410)
 - b. CHRO Bidder Contract Compliance Monitoring Report (Section 00412)

- c. Bidder Qualification Form (Section 00420)
 - d. Affidavit of Bidder re: Non-Collusion (Section 00430)
 - e. Certificate of Corporate Authority (Section 00440)
 - f. OSHA Compliance History Certification (Section 00445)
 - g. Letter re: Performance and Payment Bonds (Section 00460)
 - h. EPA American Iron and Steel Certification (Section 00483)
 - i. List of Subcontractors (Section 00485A), Names Subcontractor Bidders Qualification Statement Form (Section 00485B), and Contractor Licensing (Section 00485C)
 - j. State of Connecticut DAS Update (Bid) Statement (Section 00490)
 - k. State of Connecticut DAS Contractor Prequalification Certificate
 - l. Certificate of Legal Existence from State of Organization
 - m. Certificate of Authority to do business in Connecticut (if out of state)
- 8.2. Bid Forms shall be completed in ink or by typewriter. The Bid price of each item on the form shall be stated in words, and figures. If unit prices are required on the Bid Form, discrepancies between unit prices and their respective total amounts will be resolved in favor of the unit prices. Discrepancies between words and figures will be resolved in favor of words. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.
- 8.3. Bids by corporations shall be executed in the corporate name by the president or a vice-president (or other corporate officer accompanied by evidence of authority to sign) and the corporate seal shall be affixed and attested by the secretary or an assistant secretary. The corporate address and state of incorporation shall be shown below the signature.
- 8.4. Bids by partnerships shall be executed in the partnership name and signed by a partner, whose title shall appear under the signature. The official address of the partnership shall be shown below the signature.
- 8.5. All names shall be typed or printed below the signature.
- 8.6. The Bid shall contain an acknowledgement of receipt of all Addenda (the numbers of which shall be filled in on the Bid Form).
- 8.7. The address to which communications regarding the Bid are to be directed shall be shown clearly.
- 8.8. Two copies of each Bid shall be submitted in a sealed opaque envelope bearing on the outside the Bidder's name, address, and the Project Title for which the Bid is submitted. (If forwarded by mail, Bid and sealed envelope marked as described above shall be enclosed in another envelope with the notation "BID ENCLOSED" on the face and addressed as indicated in the Invitation to Bid.)

ARTICLE 9. RECEIPT OF BIDS

- 9.1. Sealed Bids for the work of this Contract will be received at the time and place indicated in the Invitation to Bid.
- 9.2. OWNER may consider informal any Bid not prepared and submitted in accordance with the provisions hereof.

- 9.3. Bidders are cautioned that it is the responsibility of each individual bidder to assure that their bid is in the possession of the responsible official or the designated alternate prior to the stated time and at the place of the Bid Opening. Owner is not responsible for bids delayed by mail and/or delivery services, of any nature.

ARTICLE 10. MODIFICATION AND WITHDRAWAL OF BIDS

- 10.1. Bids may be modified only by an appropriate document duly executed (in the manner that a Bid must be executed) and delivered to the place where Bids are to be submitted at any time prior to the opening of Bids.
- 10.2. Bids may be withdrawn prior to the scheduled time (or authorized postponement thereof) for the opening of Bids.
- 10.3. Any Bid received after the time and date specified shall not be considered. No Bid may be withdrawn for a period of ONE HUNDRED TWENTY (120) days, excluding Saturdays, Sundays, and legal holidays, after the actual date of the opening of the Bids.

ARTICLE 11. OPENING OF BIDS

- 11.1 At the time specified in the Invitation for Bids, no further Bids shall be accepted and filed Bids shall be opened and the amounts of the base Bid read out loud. The Bid results will be posted and the apparent low Bidder notified that its Bid will be subject to a more detailed review as set forth herein.

ARTICLE 12. ASSESSMENT OF BID FOR RESPONSIVENESS AND ELIGIBILITY

- 12.1 Upon identification of the apparent low Bidder, the Owner will carefully review the substance of the information contained in the Bid as submitted and to verify the information contained therein. A Bidder who submits a Bid package that is not complete may be deemed a non-responsive Bidder and the Bid will be rejected.
- 12.2 A Bid which includes any line item of a Bid Price that is abnormally low or high may be rejected as unbalanced. While it is often a difficult task to determine if a line Item is truly unbalanced, the Owner reserves the right to have the Bidder explain the apparent unbalancing, and, if the explanation offered is not satisfactory, to reject the Bid.
- 12.3 If a Bid contains an apparent mistake, the Owner shall advise the Bidder of the apparent mistake and the reasons the Owner concluded that the identified Bid response was a mistake. The Bidder must, within ten (10) calendar days deliver to the Owner clear and convincing documentation from the Bidder either verifying that the response was not a mistake or to admit that there was a mistake and request relief from its Bid.
- 12.4 Mistakes include but are not limited to instances where decimal points are obviously misplaced, numbers obviously reversed or units improperly designated. Bids that are, in the opinion of the Owner so much lower than either the estimate or other Bids so as to lead to the conclusion that a mistake may have been made or are unbalanced or incomplete may also result in a request for Bid verification. The Owner may also seek verification that all work contained in a unit price Bid has been included in the price offered.

12.5 The Owner reserves the right to waive any and all informalities in the Bid if it is in the Owner's interest to do so and the right to disregard all non-conforming, non-responsive or conditional Bids.

ARTICLE 13. ASSESSMENT OF BIDDERS FOR RESPONSIBILITY

13.1 The Owner reserves the right to reject any Bid if the evidence submitted by, or the investigation of, such Bidder fails to satisfy the Owner that such Bidder is properly qualified to carry out the obligations of the Contract Documents and to complete the Work contemplated therein. The Owner further reserves the right to waive any informality in or to reject any or all Bids if deemed to be in the Owner's best interest.

13.2 Bidders may be investigated by the Owner to determine if they are qualified to perform the Work. All Bidders shall be prepared to submit within **fourteen (14) calendar days** of the Owner's or Engineer's request, written evidence of such additional information and data as the Owner may deem necessary to make this determination.

13.3 The investigation of a Bidder will seek to determine whether:

- a. The Bidder has adequate financial resources to perform the Contract;
- b. The Bidder has the resources to meet the project schedule contained in the Bid documents;
- c. The Bidder has a satisfactory record of performing similar work;
- d. The Bidder has a satisfactory record of integrity and business ethics;
- e. The Bidder has the necessary organization to perform the Contract;
- f. The Bidder has the necessary technical resources and equipment needed to perform the Work.

13.4 Other work to which the Bidder is then engaged or to which it is committed may also be considered as a factor in determining responsibility.

13.5 Bids received from any Bidder whose performance on a previous Town of Montville project has been rated unacceptable in a Contractor Performance Evaluation will not be considered for award for the period specified therein.

13.6 The Bidder shall hold a current DAS Contractor Prequalification Certificate in SEWER AND WATER LINES from the Department of Administrative Services of the State of Connecticut according to C.G.S. § 4a-100, C.G.S. §4b-101 and C.G.S. §4b-91. Bidders shall submit with their Bids their DAS Contractor Prequalification Certificate along with a current Update Bid Statement. Any Bid submitted without a copy of the DAS Prequalification Certificate and an Update Bid Statement shall be invalid. As to proposed Subcontractors whose subcontract value is equal to or greater than \$500,000, the apparent low Bidder shall submit to the Owner, no later than fourteen (14) days after Bid opening, a current DAS Contractor Prequalification Certificate in an appropriate work classification along with an Update Bid Statement for each such Subcontractor. Bidders do not need to include Subcontractor Prequalification Certificates and Update Bid Statements with their Bids. The Successful Bidder and each of its Subcontractors having subcontracts in value equal to or greater than \$500,000 shall maintain and keep current their respective DAS Contractor Prequalification Certificates at all times during the term of the Contract and any warranty period set forth in the Contract Documents.

13.7 Each Bidder will include with the Bid Submission a list of Subcontractors and their qualifications as required by Section 00485A and 00485B herein. The list will include: Subcontractor's name, legal address, amount of proposed subcontract, and specification sections and qualifications to perform the

required Work. Bidders will provide this information for all Subcontractors with their Bids whose subcontracts equal or exceed \$25,000.00.

13.8 The Successful Bidder is required to self-perform a minimum of 25% of the value of the Work and to explain how that will be accomplished with its own forces in Section 00425.

13.9 Please note that this project has specific experience criteria that must be documented for a Bidder to be determined to be responsible. These criteria are included in Section 00420 of the Bid documents.

ARTICLE 14. AWARD OF CONTRACT

14.1. The Contract will be awarded to the lowest responsible and eligible Bidder (Successful Bidder).

Such a Bidder shall possess the skill, ability, and integrity necessary for the faithful performance of the work. The term "lowest responsible and eligible Bidder" as used herein shall mean the Bidder whose Base Bid is the lowest of those Bidders possessing the skill, ability and integrity necessary to the faithful performance of the Work.

14.2. The award of the contract pricing will be based upon the base bid.

14.3. OWNER reserves the right to reject any and all Bids, to waive any and all informalities if it is in Owner's best interest to do so, and the right to disregard all nonconforming, non-responsive or conditional Bids.

14.4. A Bid which includes for any item a Bid Price that is abnormally low or high may be rejected as unbalanced.

14.5. OWNER also reserves the right to reject the Bid of any Bidder that OWNER considers to be unqualified relative to Article 1 above.

14.6. If the Contract is to be awarded, OWNER will give the Successful Bidder a Notice of Award within ONE HUNDRED TWENTY (120) days, excluding Saturdays, Sundays, and legal holidays, after the actual date of the opening of the Bids. All bids shall remain open for ONE HUNDRED TWENTY (120) days, excluding Saturdays, Sundays, and legal holidays, after the actual date of the opening of the Bids but OWNER may, at OWNER's sole discretion, release any Bid and return the Bid Security prior to that date.

14.7. The Town reserves the right to accept or reject any or all base bids and accept or reject any or all bid alternatives pending availability of funds.

14.8. DELETED

14.9. As a condition of the contract award, the successful bidder shall provide proof, from the Connecticut Secretary of State's office, of its current authorization to do business in Connecticut. All Connecticut corporations must provide a Certificate of Good Standing from the Secretary of State's Office. All foreign (out of State) corporations shall provide a valid license to do business in Connecticut, in the form of a current Certificate of Authority from the Secretary of State's office and evidence of compliance with the bond requirements of the Connecticut Department of Revenue Services. These documents must be presented within thirty (30) days from the date of the bid opening.

ARTICLE 15. EXECUTION OF AGREEMENT

- 15.1. When OWNER gives a Notice of Award to the Successful Bidder, it will be accompanied by at least six (6) unsigned copies of the Agreement and all other applicable Contract Documents. Within ten (10) days, excluding Saturdays, Sundays and legal holidays, after the date of receipt of such notification CONTRACTOR shall execute and return all copies of the Agreement and all other applicable Contract Documents to OWNER.

ARTICLE 16. NONDISCRIMINATION AND AFFIRMATIVE ACTION

- 16.1 The successful Contractor agrees to the following provisions: (1) Contractor agrees and warrants that in the performance of this Agreement Contractor will not discriminate or permit discrimination against any person or group of persons on the grounds of race, color, religious creed, age, marital status, national origin, ancestry, sex, gender identity or expression, intellectual disability, mental disability or physical disability, including but not limited to blindness, unless it is shown by Contractor that such disability prevents performance of the work involved, in any manner prohibited by the laws of the United States or the State of Connecticut (the "State"); and Contractor further agrees to take affirmative action to insure that applicants with job-related qualifications are employed and that employees are treated when employed without regard to their race, color, religious creed, age, marital status, national origin, ancestry, sex, gender identity or expression, intellectual disability, mental disability or physical disability, including but not limited to blindness, unless it is shown by Contractor that such disability prevents performance of the work involved; (2) Contractor agrees, in all solicitations or advertisements for employees placed by or on behalf of Contractor, to state that it is an "affirmative action-equal opportunity employer" in accordance with regulations adopted by the Connecticut Commission on Human Rights and Opportunities (the "Commission"); (3) Contractor agrees to provide each labor union or representative of workers with which Contractor has a collective bargaining agreement or other contract or understanding and each vendor with which Contractor has a contract or understanding, a notice to be provided by the Commission advising the labor union, workers' representative and vendor of Contractor's commitments under C.G.S. §§4a-60, and to post copies of the notice in conspicuous places available to employees and applicants for employment; (4) Contractor agrees to comply with each provision of C.G.S. §§4a-60, and with each regulation or relevant order issued by said Commission pursuant to C.G.S. §§46a-56; and (5) the Contractor agrees to provide the Commission with such information requested by the Commission, and permit access to pertinent books, records and accounts, concerning the employment practices and procedures of the Contractor as relate to the provisions of C.G.S. §§4a-60 and 46a-56.

- 16.2 The successful Contractor agrees to the following provisions: (1) Contractor agrees and warrants that in the performance of this Agreement Contractor will not discriminate or permit discrimination against any person or group of persons on the grounds of sexual orientation, in any manner prohibited by the laws of the United States or the State of Connecticut, and that employees are treated when employed without regard to their sexual orientation; (2) Contractor agrees to provide each labor union or representative of workers with which Contractor has a collective bargaining agreement or other contract or understanding and each vendor with which Contractor has a contract or understanding, a notice to be provided by the Commission advising the labor union, workers' representative and vendor of Contractor's commitments under C.G.S. §4a-60a, and to post copies of the notice in conspicuous places available to employees and applicants for employment; (3) Contractor agrees to comply with each provision of C.G.S. §4a-60a, and with each regulation or relevant order issued by said Commission pursuant to C.G.S. §46a-56; and (4) the Contractor agrees to provide the Commission

with such information requested by the Commission, and permit access to pertinent books, records and accounts, concerning the employment practices and procedures of the Contractor which relate to the provisions of C.G.S. §4a-60a and 46a-56.

16.3 The successful Contractor agrees and warrants that it will make good faith efforts to employ minority business enterprises as subcontractors and suppliers of materials to perform work or services hereunder; and Contractor shall develop and maintain adequate documentation, in a manner prescribed by the Commission, of its good faith efforts.

16.4 If successful Contractor has one or more contracts with the State or a political subdivision thereof (including The OWNER) that is valued at less than fifty thousand dollars for each year of the contract, Contractor shall provide The OWNER with a written or electronic representation that complies with nondiscrimination agreements and warranties in Sections 16.1(1) and 16.2(1) above, provided if there is any change in such representation, Contractor shall provide the updated representation to The OWNER not later than thirty days after such change. If the successful Contractor has one or more contracts with the State or a political subdivision thereof (including The OWNER) that is valued at fifty thousand dollars or more for any year of the Contract, Contractor shall provide The OWNER with any of the following:

- (A) documentation in the form of a company or corporate policy adopted by resolution of the board of directors, shareholders, managers, members or other governing body of Contractor that complies with the nondiscrimination agreements and warranties in Sections 16.1(1) and 16.2(1);
- (B) documentation in the form of a company or corporate policy adopted by a prior resolution of the board of directors, shareholders, managers, members or other governing body of Contractor if (i) the prior resolution is certified by a duly authorized corporate officer of Contractor to be in effect on the date the documentation is submitted, and (ii) the head of the agency of the State or such political subdivision, or a designee, certifies that the prior resolution complies with the nondiscrimination agreements and warranties in Sections 16.1(1) and 16.2(1); or
- (C) documentation in the form of an affidavit signed under penalty of false statement by a chief executive officer, president, chairperson or other corporate officer duly authorized to adopt Contractor's company or corporate policy that certifies that the company or corporate policy of Contractor complies with the nondiscrimination agreements and warranties in Sections 16.1(1) and 16.2(1) and is in effect on the date that the affidavit is signed.

16.5 The OWNER shall not award a Contract to a Contractor who has not provided the representation or documentation required under Section 16.4, and the successful Contractor warrants that it has provided all such representations and documentation to The OWNER as required under Section 16.4 hereof. Contractor shall not be required to resubmit such representation or documentation unless there is a change in the information contained in such representation or documentation. In the event of such a change, Contractor shall submit an updated representation or documentation, as applicable, either (A) not later than thirty days after the effective date of such change, or (B) upon the execution of a new contract with the State or a political subdivision thereof, whichever is earlier. Contractor shall also certify, in accordance with Section 16.4(B) or (C) and not later than fourteen (14) days after the twelve (12) month anniversary of the most recently filed representation or documentation, that such representation or documentation on file with the State or the political subdivision thereof is current and accurate.

16.6 The successful Contractor shall include the provisions of Sections 16.1, 16.2 and 16.3 in every subcontract or purchase order entered into in order to fulfill any obligation of Contractor under this Agreement and such provisions shall be binding on a Subcontractor, vendor or manufacturer unless exempted by regulations or orders of the Commission. The Contractor shall take such action with respect to any such subcontract or purchase order as the Commission may direct as a means of enforcing such provisions including sanctions for noncompliance in accordance with C.G.S. §46a-56; provided, if Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor, as a result of such direction by the Commission, the Contractor may request the State to enter into any such litigation or negotiation prior thereto to protect the interests of the State and the State may so enter.

16.7 For purposes of this Article 16, the terms "Agreement" shall include any extension or modification of the Agreement, and "Contractor" includes any successors or assigns of the successful Contractor; and the terms "minority business enterprise" and "good faith efforts" shall have the meanings assigned to such terms in C.G.S. §4a-60(e).

ARTICLE 17. SAFETY AND HEALTH REGULATIONS

17.1. This project is subject to the Safety and Health Regulations (CFR 29, Part 1926 and all subsequent amendments) as promulgated by the U.S. Department of Labor on June 24, 1974 and CFR 29, Part 1910, General Industry Safety and Health Regulations Identified as Applicable to Construction.

17.2. The Successful Bidder shall comply with the Department of Labor Safety and Health Regulations for Construction promulgated under the Occupational Safety and Health Act of 1970 (PL-91-596) and under Section 107 of the Contract Work Hours and Safety Standards Act (PL-91-54).

17.3. The Successful Bidder shall have a competent person or persons, as required under the Occupational Safety and Health Act on the Site to inspect the Work and to supervise the conformance of the Work with the regulations of the Act.

ARTICLE 18. STATE WAGE RATES

18.1. State wage rates apply to this project. The State Wage Determination is included in Part II of the Supplementary Conditions.

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

18.3. All construction associated with this contract will be governed by Heavy and Highway Rates.

ARTICLE 19. MANUFACTURER'S EXPERIENCE

19.1. Wherever it may be written that an equipment manufacturer must have a specified period of experience with its product, equipment which does not meet the specified experience period can be considered if the equipment supplier or manufacturer is willing to provide a bond or cash deposit for the duration of the specified time period which will guarantee replacement of that equipment in the event of failure. Such bond shall be an Efficiency Guarantee Bond, executed on forms to be approved by the OWNER

ARTICLE 20. ACCESS TO SITE

- 20.1. The Owner, Engineer, and any local agencies having a direct interest in the Work shall have access to the Work wherever it is in preparation or progress and the Contractor shall provide proper facilities for such access and inspection. Refer to Article 14.01 of the General Conditions for additional requirements.

ARTICLE 21. DELETED

ARTICLE 22. UTILIZATION OF MINORITY AND WOMEN BUSINESS ENTERPRISES (MBE's AND WBE's)

- 22.1 The Contractor who is selected to perform this State project must comply with CONN. GEN. STAT. 4a-60, 4a-60a, 4a-60g. and 46a-68b through 46a-68f, inclusive, as amended by June 2015 Special Session Public Act 15-5.
- 22.2 The Bidder shall be prepared to make good faith efforts to observe the Owner's required Contract provisions regarding use of minority and women businesses for this project. The Contractor is encouraged to take affirmative steps to assure that minority business enterprises (MBE) and woman business enterprises (WBE) (as such terms are defined below) are utilized to the maximum extent practicable. The Contract participation rates prescribed by State of Connecticut agencies are 3% of the total Contract Price for MBEs and 5% of the total Contract price for WBEs. To constitute a MBE or a WBE for the purpose of meeting these agency thresholds, an enterprise must be formally certified as such by, at least, one of the following entities: the Connecticut Department of Administrative Services, the Connecticut Department of Transportation, the federal Environmental Protection Agency, the federal Small Business Administration OR other states as evidenced by the appropriate state certificate. Such certification must specify the DBE specification. In the event the certificate from a state other than Connecticut does not contain the applicable designation, the certificate should be presented to the Owner for review and consideration. In addition to the MBE and WBE participation rates set forth above, the Owner encourages the Bidder to establish and work towards a goal of additional MBE participation of 3% of the Contract Price for MBEs (for a total MBE participation goal of 8% of the Contract Price).
- 22.3 Within fourteen (14) calendar days after Bid opening, the apparent low Bidder shall complete and submit to the Owner the Subcontractor Verification Forms provided in the Bid documents, along with corresponding MBE/WBE certification for each Subcontractor. Failure to submit these documents by the close of business of the fourteenth (14) calendar day after Bid opening may result in the Bid being deemed non-responsive and warrant the rejection of the Bid.
- 22.4 Within fourteen (14) calendar days after execution of the Prime Contract, two (2) executed copies of the MBE/WBE subcontracts should be submitted to the Owner for approval. Bids which do not comply with goals for MBE/WBE participation as specified in Paragraph 22.2 may be deemed non-responsive. No payments will be made to the Contractor until executed Subcontracts are received.

ARTICLE 23. NOT USED

ARTICLE 24. AMERICAN IRON AND STEEL REQUIREMENTS

- 24.1 Bidders should know that this project is subject to PL 113-76 the Consolidated Appropriations Act, 2014, Section 436, which requires the use of iron and steel products that are wholly manufactured in the United States for inclusion in the construction of this project. The Bidder should therefore assure

that its Subcontractors, suppliers or material men are aware of this requirement and are prepared to provide certifications to the District that demonstrate compliance with this law. A copy of the acknowledgement of this requirement can be found in Section 00483 of the Contract Documents and must be provided with the Bid Documents.

- 24.2 Bidders should also note that the Contract requires that all iron and steel products be accompanied by Step Certifications. A Step Certification is a process under which each handler (supplier, fabricator, manufacturer, processor, etc.) of the iron and steel products certifies that their step in the process was domestically performed. Each time a step in the manufacturing process takes place, the manufacturer delivers its work along with a certification of its origin. A certification can be quite simple. Typically, it includes the name of the manufacturer, the location of the manufacturing facility where the product or process took place (not its headquarters), a description of the product or item being delivered, and a signature by a manufacturer's responsible party. Attached in Section 00483 are sample certifications.
- 24.3 The Environmental Protection Agency has granted a nationwide Waiver for *de minimus* components of the project provided the total cost of uncertified materials do not exceed five (5) percent of the total cost of the materials used in and incorporated into a project; the cost of an individual item may not exceed one (1) percent of the total cost of the materials used in and incorporated into a project. Incidental components subject to the Waiver include items manufactured in bulk and might include small washers, screws, fasteners (i.e., nuts and bolts), miscellaneous wire, corner bead, ancillary tube, etc. HOWEVER, significant process fittings (i.e., tees, elbows, flanges and brackets, distribution system fittings and valves, force main valves, pipes, tanks and support structures do NOT qualify for the exception.
- 24.4 To take advantage of this Waiver, the Bidder shall identify the nature of each of the items to be furnished under this Waive and be prepared to justify the items, their cost and how that cost is below the cost restraints included in the Act. The District, however, reserves the right to reject any of the items proposed as incidental components because of their cost, known availability or because they do not meet Contract requirements. In the event of a rejection, American iron and steel products must be used.

END OF SECTION

00300
BID FORMS

BID FORM

TO

THE TOWN OF MONTVILLE, CT

WWTF HEADWORKS IMPROVEMENTS PROJECT

CONTRACT NUMBER 2021-5

The undersigned declares that the only persons or parties interested in this Bid as principals are as stated; that the Bid is made without any collusion with other persons, firms, or corporations; that all the Contract Documents as prepared by Martinez Couch and Associates LLC, and dated March, 5th, 2021 have been carefully examined; that the undersigned is fully informed in regards to all conditions pertaining to the Work and the place where it is to be done, and from them the undersigned makes this Bid. These prices shall cover all expenses incurred in performing the Work required under the Contract Documents, of which this Bid Form is a part.

If a Notice of Award accompanied by at least six unsigned copies of the Agreement and all other applicable Contract Documents is delivered to the undersigned within NINETY (90) days, excluding Saturdays, Sundays, and legal holidays, after the actual date of the opening of the Bids, the undersigned will within ten (10) days, excluding Saturdays, Sundays, and legal holidays, after the date of receipt of such notification, execute and return all copies of the Agreement and all other applicable Contract Documents to OWNER. The premiums for all Bonds required shall be paid by CONTRACTOR and shall be included in the Contract Price. The undersigned Bidder further agrees that the Bid Security accompanying this Bid shall become the property of OWNER if the Bidder fails to execute the Agreement as stated above.

The undersigned hereby agrees that the Contract Time shall commence twenty (20) days following the Effective Date of the Agreement and to fully complete the Work within Two Hundred Ten (210) Calendar Days commencing twenty (20) days following the Effective Date of the Agreement, and in accordance with the terms as stated in the Agreement. The undersigned further agrees to pay OWNER, as liquidated damages, \$1,500 per day for each calendar day beyond the Contract Time Limit or extension thereof that the Work remains incomplete, in accordance with the terms of the Agreement.

All addenda related to this Contract issued by the OWNER shall be attached to and made part of this Contract. All such addenda shall be attached and submitted with this bid as confirmation and acknowledgment of receipt. Failure to submit addenda acknowledgment and confirmation along with your bid package may cause your bid to be considered non-responsive and thereby rejected. The OWNER assumes no responsibility nor shall it or its representatives be held liable for failure of the bidder to submit addenda as required hereunder.

The undersigned acknowledges receipt of addenda numbered:

Addenda #: _____ Dated: _____ Addenda #: _____ Dated: _____
Addenda #: _____ Dated: _____ Addenda #: _____ Dated: _____

In accordance with the above understanding, the undersigned proposes to perform the Work, furnish all materials and complete the Work in its entirety in the manner and under the conditions required at the price listed as follows:

BIDDER MUST FILL IN THE UNIT PRICES AND COMPUTE THE TOTALS (In case of error or discrepancies UNIT PRICES govern)				
ITEM NO	DESCRIPTION OF SCHEDULED ITEM	UNIT BID PRICES (DOLLARS AND CENTS)	ESTIMATED QTY./UNIT OF MEASURE	TOTAL PRICE (DOLLAR FIGURE)
				TOTAL PRICE (WRITTEN WORDS)
1	Installation of new Grit Classifier and Grit separator and Modifications	\$	LUMP SUM	\$
2	Installation of Plant Water Modifications		LUMP SUM	\$
TOTAL BASE BID (DOLLAR FIGURE)			\$	
TOTAL BASE BID (WRITTEN WORD)				

All Bidders are requested to note that, in addition to the award criteria listed above, the Town of Montville may award a contract value that is within their 2021 funding limit for this project, including other project costs.

As a condition of the contract award, the successful bidder shall provide proof, from the Connecticut Secretary of State's office, of its current authorization to do business in Connecticut. All Connecticut corporations must provide a Certificate of Good Standing from the Secretary of State's Office. All foreign (out of State) corporations shall provide a valid license to do business in Connecticut, in the form of a current Certificate of Authority from the Secretary of State's office and evidence of compliance with the bond requirements of the Connecticut Department of Revenue Services. These documents must be presented within thirty (30) days from the date of the bid opening.

The undersigned agrees that extra work, if any, will be performed in accordance with Article 11 and 12 of the Conditions of the Contract and will be paid for in accordance with Article 13 of the Conditions of the Contract.

The undersigned has previously performed work subject to the President's Executive Order No. 11246, which relates to nondiscrimination.

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

The above price shall include all labor, materials, tools, equipment, overhead, profit, insurance and all incidentals required to complete the Work.

The names and residences of all persons and parties interested in the foregoing Bid as principals are as follows:

(Give first and last names in full. In the case of a corporation, see Article 8.3 of the Instructions to Bidders, in the case of a partnership, see Article 8.4 of the Instructions to Bidders.)

The undersigned hereby certifies that he is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the work.

The undersigned hereby certifies under the penalties of perjury that this bid is in all respects bona fide, fair and made without collusion or fraud with any other person. As used in this section, the word "person" shall mean any natural person, joint venture, partnership, corporation, or other business or legal entity.

Social Security Number
Or Federal Identification Number

Signature of Individual or
Corporate Name

By: _____
Corporate Officer (If Applicable)

Notice of acceptance should be mailed, faxed, or delivered to the following:

(Name Print)

By: _____
(Title)

(Business Address)

(City and State)

Date _____

Note: If the Bidder is a corporation, indicate State of incorporation under signature, complete the certification below and affix corporate seal; if a partnership, give full names and residential addresses, if different from business address.

CERTIFICATE OF CORPORATE CONTRACTOR

I, _____, certify that I am
the _____ of the corporation which executed the above
(Title)
Contract, that _____, who signed this
(Name)
Contract in behalf of said Corporation was then _____
(Title)
of the Corporation signing for and on behalf of said corporation by authority of its governing body: and
was acting within the scope of its corporate powers.

By: _____

(Corporate Seal)

(Title)

END OF SECTION

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00400

SUPPLEMENTS TO BID FORMS

SECTION 00400
SUPPLEMENTS TO BID FORMS
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00490	DAS UPDATE BID STATEMENT

DOCUMENT 00410 BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we the undersigned,
_____ as PRINCIPAL, _____ and as SURETY are held and firmly bound unto **The Town of Montville** hereinafter called the "Town," in the penal sum of _____ Dollars (\$ _____), lawful money of the United States of America, to be paid to the said Town, the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the Principal has submitted the accompanying bid, dated _____, 20____, in connection and conformance with the **Town of Montville, Contract Number 2021-5** and all work associated therewith as set forth in certain Contract Drawings and Specifications filed at the office of the **Town of Montville WPCA**.

NOW, THEREFORE, if the Principal shall not withdraw said bid within the period specified therein before the opening of the same, and, if no other period be specified, said bid shall remain in effect for one hundred twenty days (120) days after the said opening and, if the bid is awarded to the Principal, the Principal if no other period be specified, within **ten (10) days** after the fully executed Contract is sent to him or her give both bond with good and sufficient surety or sureties, as may be required, for the faithful performance, payment and proper fulfillment of such Contract and insurance certificates as may be required by such Contract; or in the event of the withdrawal of said bid within the period specified, or the failure to enter into such Contract and give such bond within the time specified, the Principal shall pay the Town the difference between the amount specified in said bid and the amount for which the Town may procure the required work or supplies or both, if the latter amount be in excess of the former; or if said bid shall be rejected by the Town, then the above obligation shall be void and of no effect, otherwise to remain in full force and effect.

IN WITNESS WHEREOF, the above-bound parties have executed this instrument under their several seals this _____ day of _____ 20____ the name and corporate seal of each corporate party being hereto affixed, and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

In presence of,

_____ L.S.

_____ L.S.
(Business Address)

_____ L.S.
(Individual Principal)

_____ L.S.
(Address)

_____ (Seal)
(Corporate Principal)

By: _____

(Business Address)

Attest

_____ (Corporate Surety)

(Affix
Corporate
Seal)

By: _____
(Title)

END OF FORM

COMMISSION ON HUMAN RIGHTS AND OPPORTUNITIES
CONTRACT COMPLIANCE REGULATIONS
NOTIFICATION TO BIDDERS

(Revised 09/3/15)

The contract to be awarded is subject to contract compliance requirements mandated by Sections 4a-60 and 4a-60a of the Connecticut General Statutes; and, when the awarding agency is the State, Sections 46a-71(d) and 46a-81i(d) of the Connecticut General Statutes. There are Contract Compliance Regulations codified at Section 46a-68j-21 through 43 of the Regulations of Connecticut State Agencies, which establish a procedure for awarding all contracts covered by Sections 4a-60 and 46a-71(d) of the Connecticut General Statutes.

According to Section 46a-68j-30(9) of the Contract Compliance Regulations, every agency awarding a contract subject to the contract compliance requirements has an obligation to “aggressively solicit the participation of legitimate minority business enterprises as bidders, contractors, subcontractors and suppliers of materials.” “Minority business enterprise” is defined in Section 4a-60 of the Connecticut General Statutes as a business wherein fifty-one percent or more of the capital stock, or assets belong to a person or persons: “(1) Who are active in daily affairs of the enterprise; (2) who have the power to direct the management and policies of the enterprise; and (3) who are members of a minority, as such term is defined in subsection (a) of Section 32-9n.” “Minority” groups are defined in Section 32-9n of the Connecticut General Statutes as “(1) Black Americans . . . (2) Hispanic Americans . . . (3) persons who have origins in the Iberian Peninsula . . . (4) Women . . . (5) Asian Pacific Americans and Pacific Islanders; (6) American Indians . . .” An individual with a disability is also a minority business enterprise as provided by Section 4a-60g of the Connecticut General Statutes. The above definitions apply to the contract compliance requirements by virtue of Section 46a-68j-21(11) of the Contract Compliance Regulations.

The awarding agency will consider the following factors when reviewing the bidder’s qualifications under the contract compliance requirements:

- (a) the bidder’s success in implementing an affirmative action plan;
- (b) the bidder’s success in developing an apprenticeship program complying with Sections 46a-68-1 to 46a-68-17 of the Administrative Regulations of Connecticut State Agencies, inclusive;
- (c) the bidder’s promise to develop and implement a successful affirmative action plan;
- (d) the bidder’s submission of employment statistics contained in the “Employment Information Form”, indicating that the composition of its workforce is at or near parity when compared to the racial and sexual composition of the workforce in the relevant labor market area; and
- (e) the bidder’s promise to set aside a portion of the contract for legitimate minority business enterprises. See Section 46a-68j-30(10)(E) of the Contract Compliance Regulations.

INSTRUCTIONS AND OTHER INFORMATION

The following BIDDER CONTRACT COMPLIANCE MONITORING REPORT must be completed in full, signed, and submitted with the bid for this contract. The contract awarding agency and the Commission on Human Rights and Opportunities will use the information contained thereon to determine the bidders compliance to Sections 4a-60 and 4a-60a CONN. GEN. STAT., and Sections 46a-68j-23 of the Regulations of Connecticut State Agencies regarding equal employment opportunity, and the bidder’s good faith efforts to include minority business enterprises as subcontractors and suppliers for the work of the contract.

1) **Definition of Small Contractor**

Section 4a-60g CONN. GEN. STAT. defines a small contractor as a company that has been doing business under the same management and control and has maintained its principal place of business in Connecticut for a one year period immediately prior to its application for certification under this section, had gross revenues not exceeding fifteen million dollars in the most recently completed fiscal year, and at least fifty-one percent of the ownership of which is held by a person or persons who are active in the daily affairs of the company, and have the power to direct the management and policies of the company, except that a nonprofit corporation shall be construed to be a small contractor if such nonprofit corporation meets the requirements of subparagraphs (A) and (B) of subdivision 4a-60g CONN. GEN. STAT.

MANAGEMENT: Managers plan, organize, direct, and control the major functions of an organization through subordinates who are at the managerial or supervisory level. They make policy decisions and set objectives for the company or departments. They are not usually directly involved in production or providing services. Examples include top executives, public relations managers, managers of operations specialties (such as financial, human resources, or purchasing managers), and construction and engineering managers.

BUSINESS AND FINANCIAL OPERATIONS: These occupations include managers and professionals who work with the financial aspects of the business. These occupations include accountants and auditors, purchasing agents, management analysts, labor relations specialists, and budget, credit, and financial analysts.

MARKETING AND SALES: Occupations related to the act or process of buying and selling products and/or services such as sales engineer, retail sales workers and sales representatives including wholesale.

LEGAL OCCUPATIONS: In-House Counsel who is charged with providing legal advice and services in regards to legal issues that may arise during the course of standard business practices. This category also includes assistive legal occupations such as paralegals, legal assistants.

COMPUTER SPECIALISTS: Professionals responsible for the computer operations within a company are grouped in this category. Examples of job titles in this category include computer programmers, software engineers, database administrators, computer scientists, systems analysts, and computer support specialists.

ARCHITECTURE AND ENGINEERING: Occupations related to architecture, surveying, engineering, and drafting are included in this category. Some of the job titles in this category include electrical and electronic engineers, surveyors, architects, drafters, mechanical engineers, materials engineers, mapping technicians, and civil engineers.

OFFICE AND ADMINISTRATIVE SUPPORT: All clerical-type work is included in this category. These jobs involve the preparing, transcribing, and preserving of written communications and records; collecting accounts; gathering and distributing information; operating office machines and electronic data processing equipment; and distributing mail. Job titles listed in this category include telephone operators, bill and account collectors, customer service representatives, dispatchers, secretaries and administrative assistants, computer operators and clerks (such as payroll, shipping, stock, mail and file).

BUILDING AND GROUNDS CLEANING AND MAINTENANCE: This category includes occupations involving landscaping, housekeeping, and janitorial services. Job titles found in this category include supervisors of landscaping or housekeeping, janitors, maids, grounds maintenance workers, and pest control workers.

CONSTRUCTION AND EXTRACTION: This category includes construction trades and related occupations. Job titles found in this category include boilermakers, masons (all types), carpenters, construction laborers, electricians, plumbers (and related trades), roofers, sheet metal workers, elevator installers, hazardous materials removal workers, paperhangers, and painters. Paving, surfacing, and tamping equipment operators; drywall and ceiling tile installers; and carpet, floor and tile installers and finishers are also included in this category. First line supervisors, foremen, and helpers in these trades are also grouped in this category..

INSTALLATION, MAINTENANCE AND REPAIR: Occupations involving the installation, maintenance, and repair of equipment are included in this group. Examples of job titles found here are heating, ac, and refrigeration mechanics and installers; telecommunication line installers and repairers; heavy vehicle and mobile equipment service technicians and mechanics; small engine mechanics; security and fire alarm systems installers; electric/electronic repair, industrial, utility and transportation equipment; millwrights; riggers; and manufactured building and mobile home installers. First line supervisors, foremen, and helpers for these jobs are also included in the category.

MATERIAL MOVING WORKERS: The job titles included in this group are Crane and tower operators; dredge, excavating, and lading machine operators; hoist and winch operators; industrial truck and tractor operators; cleaners of vehicles and equipment; laborers and freight, stock, and material movers, hand; machine feeders and offbearers; packers and packagers, hand; pumping station operators; refuse and recyclable material collectors; and miscellaneous material moving workers.

PRODUCTION WORKERS: The job titles included in this category are chemical production machine setters, operators and tenders; crushing/grinding workers; cutting workers; inspectors, testers sorters, samplers, weighers; precious stone/metal workers; painting workers; cementing/gluing machine operators and tenders; etchers/engravers; molders, shapers and casters except for metal and plastic; and production workers.

<p><u>White</u> (not of Hispanic Origin)- All persons having origins in any of the original peoples of Europe, North Africa, or the Middle East.</p> <p><u>Black</u>(not of Hispanic Origin)- All persons having origins in any of the Black racial groups of Africa.</p> <p><u>Hispanic</u>- All persons of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race.</p>	<p><u>Asian or Pacific Islander</u>- All persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian subcontinent, or the Pacific Islands. This area includes China, India, Japan, Korea, the Philippine Islands, and Samoa.</p> <p><u>American Indian or Alaskan Native</u>- All persons having origins in any of the original peoples of North America, and who maintain cultural identification through tribal affiliation or community recognition.</p>
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BIDDER CONTRACT COMPLIANCE MONITORING REPORT

PART I - Bidder Information

Company Name Street Address City & State Chief Executive	Bidder Federal Employer Identification Number _____ Or Social Security Number _____
Major Business Activity (brief description)	Bidder Identification (response optional/definitions on page 1) -Bidder is a small contractor. Yes ___ No ___ -Bidder is a minority business enterprise Yes ___ No ___ (If yes, check ownership category) Black ___ Hispanic ___ Asian American ___ American Indian/Alaskan Native ___ Iberian Peninsula ___ Individual(s) with a Physical Disability ___ Female ___
Bidder Parent Company (If any)	- Bidder is certified as above by State of CT Yes ___ No ___
Other Locations in Ct. (If any)	

PART II - Bidder Nondiscrimination Policies and Procedures

1. Does your company have a written Affirmative Action/Equal Employment Opportunity statement posted on company bulletin boards? Yes ___ No ___	7. Do all of your company contracts and purchase orders contain non-discrimination statements as required by Sections 4a-60 & 4a-60a Conn. Gen. Stat.? Yes ___ No ___
2. Does your company have the state-mandated sexual harassment prevention in the workplace policy posted on company bulletin boards? Yes ___ No ___	8. Do you, upon request, provide reasonable accommodation to employees, or applicants for employment, who have physical or mental disability? Yes ___ No ___
3. Do you notify all recruitment sources in writing of your company's Affirmative Action/Equal Employment Opportunity employment policy? Yes ___ No ___	9. Does your company have a mandatory retirement age for all employees? Yes ___ No ___
4. Do your company advertisements contain a written statement that you are an Affirmative Action/Equal Opportunity Employer? Yes ___ No ___	10. If your company has 50 or more employees, have you provided at least two (2) hours of sexual harassment training to all of your supervisors? Yes ___ No ___ NA ___
5. Do you notify the Ct. State Employment Service of all employment openings with your company? Yes ___ No ___	11. If your company has apprenticeship programs, do they meet the Affirmative Action/Equal Employment Opportunity requirements of the apprenticeship standards of the Ct. Dept. of Labor? Yes ___ No ___ NA ___
6. Does your company have a collective bargaining agreement with workers? Yes ___ No ___ 6a. If yes, do the collective bargaining agreements contain non-discrimination clauses covering all workers? Yes ___ No ___ 6b. Have you notified each union in writing of your commitments under the nondiscrimination requirements of contracts with the state of Ct? Yes ___ No ___	12. Does your company have a written affirmative action Plan? Yes ___ No ___ If no, please explain. 13. Is there a person in your company who is responsible for equal employment opportunity? Yes ___ No ___ If yes, give name and phone number. _____

1. Will the work of this contract include subcontractors or suppliers? Yes__ No__

1a. If yes, please list all subcontractors and suppliers and report if they are a small contractor and/or a minority business enterprise. (defined on page 1 / use additional sheet if necessary)

1b. Will the work of this contract require additional subcontractors or suppliers other than those identified in 1a. above?

Yes__ No__

PART IV - Bidder Employment Information

Date:

JOB CATEGORY *	OVERALL TOTALS	WHITE (not of Hispanic origin)		BLACK (not of Hispanic origin)		HISPANIC		ASIAN or PACIFIC ISLANDER		AMERICAN INDIAN or ALASKAN NATIVE	
		Male	Female	Male	Female	Male	Female	Male	Female	male	female
Management											
Business & Financial Ops											
Marketing & Sales											
Legal Occupations											
Computer Specialists											
Architecture/Engineering											
Office & Admin Support											
Bldg/ Grounds Cleaning/Maintenance											
Construction & Extraction											
Installation , Maintenance & Repair											
Material Moving Workers											
Production Occupations											
TOTALS ABOVE											
Total One Year Ago											
FORMAL ON THE JOB TRAINEES (ENTER FIGURES FOR THE SAME CATEGORIES AS ARE SHOWN ABOVE)											
Apprentices											
Trainees											

*NOTE: JOB CATEGORIES CAN BE CHANGED OR ADDED TO (EX. SALES CAN BE ADDED OR REPLACE A CATEGORY NOT USED IN YOUR COMPANY)

1. Which of the following recruitment sources are used by you? (Check yes or no, and report percent used)				2. Check (X) any of the below listed requirements that you use as a hiring qualification (X)	3. Describe below any other practices or actions that you take which show that you hire, train, and promote employees without discrimination
SOURCE	YES	NO	% of applicants provided by source		
State Employment Service				Work Experience	
Private Employment Agencies				Ability to Speak or Write English	
Schools and Colleges				Written Tests	
Newspaper Advertisement				High School Diploma	
Walk Ins				College Degree	
Present Employees				Union Membership	
Labor Organizations				Personal Recommendation	
Minority/Community Organizations				Height or Weight	
Others (please identify)				Car Ownership	
				Arrest Record	
				Wage Garnishments	

Certification (Read this form and check your statements on it CAREFULLY before signing). I certify that the statements made by me on this BIDDER CONTRACT COMPLIANCE MONITORING REPORT are complete and true to the best of my knowledge and belief, and are made in good faith. I understand that if I knowingly make any misstatements of facts, I am subject to be declared in non-compliance with Section 4a-60, 4a-60a, and related sections of the CONN. GEN. STAT.

(Signature)	(Title)	(Date Signed)	(Telephone)
-------------	---------	---------------	-------------

DOCUMENT 00420 BIDDER'S QUALIFICATION FORM

The bidder is required to provide the following information to enable the Town to evaluate the bidder's ability to perform the Work.

- A. Form of bidder (corporation, limited partnership, partnership, individual):
- B. Date of organization/commencement:
- C. State in which organized:
- D. If a corporation:
 - 1. The corporation is qualified to do business and is in good standing in the State of Connecticut?
___yes ___no
 - 2. The corporation's agent for service of process is:

Name: _____
Address: _____

 - 3. The corporation is in good standing with the:
U.S. Internal Revenue Service ___yes ___no;
Connecticut Department of Labor: ___yes ___no;
U.S. Labor Department: ___yes ___no.
- E. License number under which Contractor will perform work #
 - 1. Name of licensee: _____
- F. Please describe other work that you have performed which is similar to the work, stating the dates performed, the entity for whom the work was performed and whether the work was performed in accord with the terms of the agreement:

G. Please list at least two (2) reference the Town may contact to evaluate the bidder's experience, skill available financial resources, credit and business standing.

END OF FORM

DOCUMENT 00430 AFFIDAVIT OF BIDDER

STATE OF _____)
ss. at
COUNTY OF _____)

_____deposes and says:
(Name of Affiant)

- 1) That he/she is _____ (representative capacity) of the party submitting the foregoing bid;
- 2) that such bid is genuine and not collusive or a sham;
- 3) that said bidder has not colluded, conspired, connived or agreed, directly or indirectly, with any bidder or person to put in a sham bid or to refrain from bidding, has not in any manner, directly or indirectly, sought by agreement, collusion, communication or conference with any person to fix the bid price of affiant or any other bidder or to fix any overhead, profit or cost element of said bid price, or of that of any other bidder or to secure any advantage against **The Town of Montville** or any person interested in the proposed Contract;
- 4) that all statements contained in such proposal or bid are true;
- 5) that no person other than those named herein are interested in this bid or in the Contract to be awarded pursuant to the Instruction to Bidders; and
- 6) that no person acting for or employed by **The Town of Montville** is now or will hereafter be directly or indirectly interested therein or in any portion of the profits thereof in any manner which is contrary to law or is unethical.

Name of bidder if the bidder is an individual

Name of partner if the bidder is a partnership

Name of officer if the bidder is a corporation

Subscribed and sworn to before me,
the undersigned, this ___ day of
_____, 20__.

Commissioner of the Superior Court
Notary Public/My Commission Expires

END OF FORM

DOCUMENT 00440 CERTIFICATE AS TO CORPORATE BIDDER

I, _____ certify that I am
(Name)
the _____ of the Corporation named as Bidder
(Title)
in the Bid Form; that _____ who
(Name)
signed said Bid Form on behalf of the Bidder was then _____
(Title)
of said Corporation; that I know his signature; that his signature thereto is genuine, and that said Bid
Form was duly signed, sealed and executed for and in behalf of said Corporation by authority of its
governing body.

DATE _____
Secretary _____

END OF SECTION

DOCUMENT 00445 OSHA COMPLIANCE HISTORY CERTIFICATION

The undersigned Bidder hereby certifies as follows:

1. It has not, in the past three years, received any citations from the United States Department of Labor, Occupational Safety and Health Administration for willful violations of the Occupational Safety and Health Act ("OSHA"); or
2. It has been cited for willful violations of the OSHA in the past three years and the circumstances and resolutions of such violations are as follows:

3. The list following is a list of all OSHA citation issued against the bidder in the past three years:

Name of bidder if the bidder is an individual

Name of partner if the bidder is a partnership

Name of officer if the bidder is a corporation

Subscribed and sworn to before me, the under, this ____ day of ____, 20 ____.

Commissioner of the Superior Court
Notary Public/My Commission Expires

END OF FORM

DOCUMENT 00460 LETTER RE: PERFORMANCE AND PAYMENT BONDS

The Town of Montville
310 Norwich-New London Turnpike
Uncasville, CT 06382

Re: Performance and Payment Bonds

Gentlemen:

This is to assure The Town of Montville that, in the event Contract Number 2021-5 is awarded to _____ the undersigned agrees that it will provide to **The Town of Montville**, on behalf of _____ the Performance and Payment Bonds required pursuant to the General Conditions and Supplemental Conditions of the Contract, in the full amount of the Contract.

Sincerely,

SURETY:

BY: _____

END OF DOCUMENT

DOCUMENT 00483
AMERICAN IRON AND STEEL

Sample Certifications

The following information is provided as a sample letter of step certification for AIS compliance. Documentation must be provided on company letterhead.

Date

Company Name Company Address City, State Zip

Subject: American Iron and Steel Step Certification for Contract (Insert Number) I, (company representative), certify that the (melting, bending, coating, galvanizing, cutting, etc.) process for (manufacturing or fabricating) the following products and/or materials shipped or provided for the subject project is in full compliance with the American Iron and Steel requirement as mandated in EPA's State Revolving Fund Programs.

Item, Products and/or Materials:

1. Xxxx
2. Xxxx
3. Xxxx

Such process took place at the following location:

If any of the above compliance statements change while providing material to this project we will immediately notify the prime contractor and the engineer.

Signed by company representative

The following information is provided as a sample letter of certification for AIS compliance.
Documentation must be provided on company letterhead.

Date

Company Name Company Address City, State Zip

Subject: American Iron and Steel Certification for Contract (Insert Number)

I, (company representative), certify that the following products and/or materials shipped/provided to the subject project are in full compliance with the American Iron and Steel requirement as mandated in EPA's State Revolving Fund Programs.

Item, Products and/or Materials:

1. Xxxx
2. Xxxx
3. Xxxx

Such process took place at the following location:

If any of the above compliance statements change while providing material to this project we will immediately notify the prime contractor and the engineer.

Signed by company representative

CONTRACTOR CERTIFICATION

American Iron and Steel

The Contractor acknowledges to and for the benefit of the Town of Montville, Connecticut ("Purchaser") and the State of Connecticut (the "State") that it understands the goods and services under this Agreement are being funded with monies made available by the Clean Water State Revolving Fund and/or Drinking Water State Revolving Fund that have statutory requirements commonly known as "American Iron and Steel;" that requires all of the iron and steel products used in the project to be produced in the United States ("American Iron and Steel Requirement") including iron and steel products provided by the Contractor pursuant to this Agreement. The Contractor hereby represents and warrants to and for the benefit of the Purchaser and the State that (a) the Contractor has reviewed and understands the American Iron and Steel Requirement, (b) all of the iron and steel products used in the project will be and/or have been produced in the United States in a manner that complies with the American Iron and Steel Requirement, unless a waiver of the requirement is approved, and (c) the Contractor will provide any further verified information, certification or assurance of compliance with this paragraph, or information necessary to support a waiver of the American Iron and Steel Requirement, as may be requested by the Purchaser or the State. Notwithstanding any other provision of this Agreement, any failure to comply with this paragraph by the Contractor shall permit the Purchaser or State to recover as damages against the Contractor any loss, expense, or cost (including without limitation attorney's fees) incurred by the Purchaser or State resulting from any such failure (including without limitation any impairment or loss of funding, whether in whole or in part, from the State or any damages owed to the State by the Purchaser). While the Contractor has no direct contractual privity with the State, as a lender to the Purchaser for the funding of its project, the Purchaser and the Contractor agree that the State is a third-party beneficiary and neither this paragraph (nor any other provision of this Agreement necessary to give this paragraph force or effect) shall be amended or waived without the prior written consent of the State.

IN WITNESS WHEREOF, the undersigned has executed this Certification as of this _____ day of _____, 20____.

BIDDER

Printed Name Print)

By: _____
(Signature of Bidder)

Subscribed and sworn to before me,
The undersigned, this ____ day of _____, 20 ____.

Commissioner of the Superior Court
Notary Public
My Commission Expires: _____

Print Name and Title of
Authorized Signatory

SECTION 00485A

LIST OF SUBCONTRACTORS

SUBCONTRACTORS:

Include names of subcontractors, including type of work and MBE/WBE certification or non W/MBE.

List of Subcontractors must include all subcontractors to be used for work included in the Contract Documents, and with contract values \$25,000 or greater. Also note that all MBE/WBE subcontractors must be listed; however, this is not required to be part of the bid submission, but shall be provided as an update in accordance with Article 13.7 of the Instruction to Bidders.

[Add additional pages as necessary.]

NAME/ ADDRESS	PHONE #	TYPE OF WORK/SPEC SECTION	ESTIMATED VALUE OF WORK (\$)	MBE/WBE

NAME/ ADDRESS	PHONE #	TYPE OF WORK/SPEC SECTION	ESTIMATED VALUE OF WORK (\$)	MBE/WBE

SECTION 00485B

NAMED SUBCONTRACTOR

BIDDERS QUALIFICATION STATEMENT MUST BE SUBMITTED WITH THIS FORM

(This form shall be submitted for any Subcontractor Agreement of \$25,000 or greater) If a question or request for information does not pertain to your organization in any way, use the symbol "NA" (Not Applicable). Use additional 8 1/2" x 11" sheets with your letterhead as necessary.

1. Indicate exactly the name by which this organization is known, legal address, telephone, value of this Subcontractor Agreement and the Section / Sections of the Technical Specifications applicable to the Subcontractor Agreement:

Name _____

Address: _____

Subcontractor Agreement Value _____

Describe Subcontractor's work and include the references to the technical specifications Sections: _____

2. How many years has this organization been in business under its present business name?

Years: _____

3. How many years has this organization been in business as a Subcontractor?

Years: _____

4. If this organization has not always been a Subcontractor, list the trade(s) that your firm customarily performed prior to the time that you became a Subcontractor:

4.1 _____

4.2 _____

4.3 _____

5. Indicate all other names by which this organization has been known and the length of time known by each name:

5.1 _____

5.2 _____

5.3 _____

6. This firm is a:

Corporation:

Partnership:

Sole Proprietorship:

Joint Venture:

Other: _____

7. Attach resumes of all supervisory personnel, such as Principals, Project Managers, and Superintendents, who will be directly involved with the project on which you are now a bidder. Indicate the number of years of construction experience and number of years of which they were in a Supervisory capacity.

8. List all sub-trades which your firm customarily performs with own employees – **this table must be completed for electrical and mechanical trades for all projects, and also for all named trades for threshold projects.** Include also the following licenses if applicable to the Subcontractor Agreement:

8.1 Unlimited plumbing-piping contractor's license (P-1)

8.2 Unlimited plumbing-piping journey person's license (P-2)

8.3 Plumbing & Piping Limited Contractor (P-7)

8.4 Licensed Land Surveyor (Sec 20-300-1)

8.5 Limited Electrical Contractor

8.6 Limited Electrical Journeyman

TRADE	NAME OF LICENSE HOLDER	STATE OF CT D.C.P. LICENSE/REGISTRATION NO. FORMAT: PREFIX-NUMBER- SUFFIX
8.1		
8.2		
8.3		
8.4		
8.5		
8.6		

9. **Trade References:** Names, addresses and telephone numbers of several firms with whom your organization has regular business dealings (attach separate sheets as necessary):

10. **All** Construction Projects your organization has **in process** (attach separate sheets using the following format as necessary):

10.1 Specific Title & Location _____

10.2 Contract Amount: _____

10.3 Description of your scope
of work performed: _____

10.4 Owner: _____

10.5 General Contractor: _____

10.6 Designer: _____

10.7 Start Date: _____

10.8 Finish Date: _____

***10.9** Any complaint on Quality
or Management: _____

10.10 Owners Representative: _____
(Name) (Telephone Number)

10.11 G.C. Representative: _____
(Name) (Telephone Number)

11. All Construction Projects your organization has **completed** in the past five years or the 20 projects most recently completed (attach separate sheets using the following format as necessary):

11.1 Specific Title & Location _____

11.2 Contract Amount: _____

11.3 Description of your scope
of work performed: _____

11.4 Owner: _____

11.5 General Contractor: _____

11.6 Designer: _____

11.7 Start Date: _____

11.8 Finish Date: _____

*11.9 Any complaint on Quality
or Management: _____

11.10 Owners Representative: _____
(Name) (Telephone Number)

11.11 G.C. Representative: _____
(Name) (Telephone Number)

***Please attach a separate sheet explaining any negative entry in this row.**

12. Has your organization ever failed to complete a contract, or has any officer or partner of your organization ever been an officer or partner of another organization that failed to complete a contract? If so, indicate the circumstances leading to the project failure and the name of the company which provided the bonding for the failed contract(s):

13. List all legal or administrative proceedings currently pending or concluded adversely within the last five years which relate to procurement or performance of any public or private construction contracts. (Exclude OSHA violations which are called for elsewhere in this statement).

13.1

Attached:

13.2 N/A:

14. List all willful or serious violations of any Occupational Safety and Health Act (OSHA) or of any standard, order or regulation promulgated pursuant to such act, during the three year period preceding the bid, provided such violations were cited in accordance with the provisions of any State Occupational Safety and Health Act or Occupational Safety and Health Act of 1970. Indicate whether these were abated within the time fixed by the citation or whether the citation was appealed. If appealed what is the status or disposition.

14.1 _____

14.2 _____

14.3 _____

15. Has your organization had any criminal convictions related to the injury or death of any employee in the three-year period preceding the bid. Please list any such convictions below.

15.1 _____

15.2 _____

15.3 _____

Dated at _____

Signed this _____ day of _____, 20__

Name of Organization: _____

Signature: _____

(Print Name): _____

Title: _____

Notary Statement:

Mr./Mrs./Ms. _____ being duly sworn
deposes and says that he/she is the _____ of
_____ (Position or Title)
_____, and that the answers to the forgoing
(Firm Name)
questions and all statements therein contained are true and correct.

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

Notary Public _____

My Commission Expires _____, 20__

This form must be submitted for each of the Named Subcontractors and attached to the Bid Submission.

END OF FORM

SECTION 00485C

TRADESMAN LICENSING

Connecticut General Statutes Title 20 Chapters 391 and 393 and the Regulations of Connecticut State Agencies, Title 20: Professional Licenses, Department of Consumer Protection (4) Occupational Licenses, Sec. 20-332 require certain tradesmen to be licensed to perform their work. One or more of those trades may be needed to perform this project. Prior to performing work requiring a license, the Contractor shall provide The OWNER a list of the names, addresses, Effective and Expiration dates and license number and a copy of the license for each tradesman holding a contractors or journeyman's license as may be required.

Trades requiring licenses include, but may not be limited to: Plumbing, Electrical and Land Surveyors.

Contractors are urged to consult with the Department of Consumer Protection to resolve any license questions prior to starting work.

State of Connecticut
 Department of Administrative Services (DAS) Contractor Prequalification
Update (Bid) Statement
 (Statement to be included with the bid)

Connecticut General Statute §4a-100 and Connecticut General Statute §4b-91

Each bid submitted for a contract shall include a copy of a prequalification certificate issued by the Commissioner of Administrative Services. The bid shall also be accompanied by an **update bid statement** in such form as the Commissioner of Administrative Services prescribes. The form for such **update bid statement** shall provide space for information regarding all projects completed by the bidder since the date the bidder's prequalification certificate was issued or renewed, all projects the bidder currently has under contract, including the percentage of work on such projects not completed, the names and qualifications of the personnel who will have supervisory responsibility for the performance of the contract, any significant changes in the bidder's financial position or corporate structure since the date the certificate was issued or renewed, any change in the contractor's qualification status, and such other relevant information as the Commissioner of Administrative Services prescribes. Any bid submitted without a copy of the prequalification certificate and an **update bid statement** shall be invalid. Any public agency that accepts a bid submitted without a copy of such prequalification certificate and an **update bid statement**, as required by this section, may become ineligible for the receipt of funds related to such bid.

Name of Project that company is bidding on:		
Project Number:		
Name of Company:		
FEIN:		
Company Address:		
Prequalification Contact:		Telephone Number:
Date of Prequalification with the DAS:	Single Limit:	Aggregate Work Capacity (AWC):
* This amount equals your company's AWC minus the Total \$ Amount of Work Remaining.		* Remaining Aggregate Work Capacity:

Please list all of your company's BONDED PROJECTS (BOTH PUBLIC AND PRIVATE) WHICH WERE 100% COMPLETED SINCE THE DATE YOUR PREQUALIFICATION WAS ISSUED OR RENEWED: (Please add additional page(s) if required)

Name of Project	Owner of Project	Date Project Completed	Total Contract Amount

Please list all of your company's BONDED PROJECTS (BOTH PUBLIC AND PRIVATE) CURRENTLY UNDER CONTRACT:
 (Please add additional page(s) if required. Please total the Work Remaining column)

Name of Project	Owner of Project	Total Contract Amount	% Complete	Work Remaining (\$)
Total \$ Amount of Work Remaining →				

Please list the names and titles of the personnel who will have supervisory responsibility for the performance of the contract being bid on:
 (Please add additional page(s) if required)

Individual Name	Title of Individual

Have there been any changes in your company's financial condition or business organization, which might affect your company's ability to successfully complete this contract?

Yes No

If yes, please explain:

I certify under penalty of law that all of the information contained in this Update (Bid) Statement is true and accurate to the best of my knowledge as of the date below.

Signature

Date

It is the responsibility of the Awarding Authority to determine if any of the information provided above will impact the contractor's performance on this project.
 The DAS' Contractor Prequalification Program can be reached at (860) 713-5280

00500
AGREEMENT

THE TOWN OF MONTVILLE, CT
WWTF HEADWORKS IMPROVEMENT PROJECT
CONTRACT NUMBER 2021-5

AGREEMENT

THIS AGREEMENT made as of _____ the day of _____ in the year 20 by ____ and
between **The Town of Montville, a municipality having an office at 310 Norwich-New London
Turnpike, Uncasville, Connecticut, 06382** acting through its WPCA hereinafter called OWNER and

_____ with legal address and principal place of business at _____

_____ hereinafter called CONTRACTOR. OWNER and

CONTRACTOR in consideration of the mutual covenants hereinafter set forth, agree as follows:

ARTICLE 1. WORK

1.1 CONTRACTOR shall perform the Work as specified or indicated in the Contract Documents. The Work is as described in SECTION 01010.

ARTICLE 2. ENGINEER.

2.1. The Project has been designed by Martinez Couch and Associates, LLC who will act as ENGINEER in connection with completion of the Work in accordance with the Contract Documents.

ARTICLE 3. CONTRACT TME.

3.1. The Contract Time shall be Two Hundred Ten 210 Calendar Days commencing twenty (20) days following the Effective Date of this Agreement.

3.2. CONTRACTOR agrees that the Work shall be prosecuted regularly, diligently and uninterruptedly and at such rate of progress as will insure full completion thereof within the Contract Time stated above. It is expressly understood and agreed, by and between CONTRACTOR and OWNER that the Contract Time is reasonable for the completion of the Work, taking into consideration the average climatic range and usual industrial conditions prevailing in this locality.

ARTICLE 4. CONTRACT PRICE.

4.1. OWNER will pay CONTRACTOR for performance of the Work in accordance with the Contract Documents in current funds at the unit price agreed upon in the CONTRACTOR's Bid Form attached to this Agreement.

ARTICLE 5. APPLICATIONS FOR PAYMENT

5.1. CONTRACTOR shall submit Applications for Payment in accordance with Article 14 of the

Conditions of the Contract. Applications for Payment will be processed by ENGINEER as provided in the Conditions of the Contract.

ARTICLE 6. PROGRESS AND FINAL PAYMENTS

- 6.1. OWNER will make progress payments on account of the Contract Price on the basis of CONTRACTOR's Applications for Payment as recommended by ENGINEER, monthly during construction as provided below. All progress payments will be on the basis of the progress of the Work measured by the schedule of values provided for in Paragraph 14.01. of the Conditions of the Contract.
- 6.2. Prior to Substantial Completion, progress payments will be in an amount equal to 95 percent of the value of the Work completed, less, the aggregate of payments previously made.
- 6.3. Upon Substantial Completion, OWNER will pay an amount sufficient to increase total payments to CONTRACTOR to 98 percent of the Contract Price, less retainages as ENGINEER shall determine, in accordance with Paragraph 14.02. of the Conditions of the Contract.
- 6.4. Upon final inspection and acceptance of the Work, in accordance with Paragraph 14.07. of the Conditions of the Contract, OWNER will pay the remainder of the Contract Price as recommended by ENGINEER.

ARTICLE 7. LIQUIDATED DAMAGES

- 7.1. OWNER and CONTRACTOR recognize that time is of the essence of this Agreement and that OWNER will suffer financial loss if the Work is not completed within the Contract Time specified in Article 3 above, plus any extensions thereof allowed in accordance with Article 12 of the General Conditions. They 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) CONTRACTOR shall pay OWNER \$ 1 ,500 per day for each calendar day of delay until the Work is complete.
- 7.2. Provided, that CONTRACTOR shall not be charged with liquidated damages or any excess cost when the delay in completion of the Work is for reasons included in Paragraph 12.03 of the General Conditions. Provided, further, that CONTRACTOR shall, furnish OWNER the required notification of such delays in accordance with Paragraph 12.02 of the General Conditions.

ARTICLE 8. ASSURANCE

- 8.1. CONTRACTOR has familiarized himself with the nature and extent of the Contract Documents, Work, locality, and with all local conditions and Federal, State and local laws, ordinances, rules and regulations that in any manner may affect cost, progress or performance of the Work.
- 8.2. CONTRACTOR has made or caused to be made examinations, investigations and tests and studies of such reports and related data as CONTRACTOR deems necessary for the performance of the Work at the Contract Price within the Contract Time and in accordance with the other terms and conditions of

the Contract Documents; and no additional examinations, investigations, tests, reports or similar data are or will be required for such purposes.

8.3. CONTRACTOR has correlated the results of all such observations, examinations, investigations, tests, reports and data with the terms and conditions of the Contract Documents.

8.4. CONTRACTOR has given ENGINEER written notice of any conflict, error or discrepancy that CONTRACTOR has discovered in the Contract Documents and the written resolution thereof by ENGINEER is acceptable to CONTRACTOR.

8.5. CONTRACTOR agrees that the Contract Documents are sufficient in scope and detail to indicate and convey understanding of all terms and conditions for performance of the Work.

ARTICLE 9. CONTRACT DOCUMENTS.

9.1. The Contract Documents which comprise the Contract between OWNER and CONTRACTOR are attached hereto and made a part hereof and consist of the following:

9.1.1. Invitation To Bid.

9.1.2. Instructions To Bidders

9.1.3. Bid Form.

9.1.4. This Agreement.

9.1.5. Performance Bond, EJCDC Document C-610, 2018 edition, Payment Bond, EJCDC Document C-615, 2018 edition, and other required Bonds.

9.1.6. Certificate of Insurance.

9.1.7. General Conditions, EJCDC Document No. C-700, 2018 edition.

9.1.8. Supplementary General Conditions.

9.1.9. Specifications (as listed in Table of Contents).

9.1.10. Drawings dated March 5, 2021 and enumerated as follows.

<u>Sheet No.</u>	<u>Title</u>
G-01	Title Sheet
G-02	Hydraulic Profile of Headworks Facility
C-01	Existing Conditions
C-02	Proposed Conditions
C-100	Site Work General Notes, Standard Abbreviations, and Property map

C-101	Site Layout Plan
C-102	Site Utilities & Grading
C-103	Soil Erosion & Sedimentation Control Plan
C-104	Soil Erosion & Sedimentation Control Details
C-105	Site Plan Details
M-01	Headworks Building Mechanical Plan & Sections
M-02	Grit Separator and Headworks Details
M-03	Plant Water Modifications Plan - Control Building -
E-101	Electrical Site Plan
E-102	Power Floor Plans
S-001	General Notes & Abbreviations
S-100	Foundation Plan
S-500	Grit Separator Structural Details
S-501	Grit Separator Structural Details

9.1.11. Addenda numbers _____ to _____ inclusive.

9.1.12. Any modification, including Change Orders, duly delivered after execution of Agreement.

ARTICLE 10. MISCELLANEOUS

10.1. Terms used in this Agreement which are defined in Article 1 of the Conditions of the Contract shall have the meanings assigned in the Conditions of the Contract.

10.2. Neither OWNER nor CONTRACTOR shall, without the prior written consent of the other, assign or sublet in whole or in part any interest under any of the Contract Documents; and, specifically but without limitation, CONTRACTOR shall not assign any monies due or to become due without the prior written consent of OWNER. In case CONTRACTOR assigns all or any part of any monies due or to become due under this Contract, the instrument of assignment shall contain a clause substantially to the effect that it is agreed that the right of the assignee in and to any monies due or to become due to CONTRACTOR shall be subject to prior claims of all persons, firms and corporations for services rendered or materials supplied for the performance of the Work called for in this Contract.

10.3. OWNER and CONTRACTOR each binds himself, his partners, successors, assigns and legal representatives in respect to all covenants, agreements and obligations contained in the Contract Documents.

10.4. The Contract Documents constitute the entire agreement between OWNER and CONTRACTOR and may only be altered, amended or repealed by a Modification.

IN WITNESS WHEREOF, the parties hereto have signed this Agreement in sextuple. Two (2) copies have been delivered to OWNER, one copy to the CONTRACTOR, and one copy to the ENGINEER. All portions of the Contract Documents have been signed or identified by OWNER and CONTRACTOR or by ENGINEER on their behalf.

This Agreement shall become effective on _____, 20__.

THE TOWN OF MONTVILLE, CT

CONTRACTOR

BY

BY

(CORPARATE SEAL)

(CORPORATE SEAL)

Attest

Attest

Address for giving notices

Address for giving notices

Note: If CONTRACTOR is a corporation, an affidavit giving the principal the right to sign the Agreement must accompany the executed Agreement.

Approved as to Form and Content:

Town Council

END OF SECTION

00600

BONDS AND CERTIFICATES

DO NOT REMOVE
THIS PAGE INTENTIONALLY LEFT BLANK

DOCUMENT 00600 BONDS AND CERTIFICATES

TABLE OF CONTENTS

00610	PERFORMANCE BOND (attached)
00615	PAYMENT BONDS (attached)

END OF SECTION

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.

PERFORMANCE BOND

Prepared By



Endorsed By



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PERFORMANCE BOND

Contractor Name: Address <i>(principal place of business)</i> :	Surety Name: Address <i>(principal place of business)</i> :
Owner Name: Mailing address <i>(principal place of business)</i> :	Contract Description <i>(name and location)</i> : WWTF Headworks Improvements Project Contract No. 2020-XX Contract Price: Effective Date of Contract:
Bond Bond Amount: Date of Bond: <i>(Date of Bond cannot be earlier than Effective Date of Contract)</i> Modifications to this Bond form: <input checked="" type="checkbox"/> None <input type="checkbox"/> See Paragraph 16	
Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth in this Performance Bond, do each cause this Performance Bond to be duly executed by an authorized officer, agent, or representative.	
Contractor as Principal	Surety
_____ <i>(Full formal name of Contractor)</i>	_____ <i>(Full formal name of Surety) (corporate seal)</i>
By: _____ <div style="text-align: center;"><i>(Signature)</i></div>	By: _____ <div style="text-align: center;"><i>(Signature)(Attach Power of Attorney)</i></div>
Name: _____ <div style="text-align: center;"><i>(Printed or typed)</i></div>	Name: _____ <div style="text-align: center;"><i>(Printed or typed)</i></div>
Title: _____	Title: _____
Attest: _____ <div style="text-align: center;"><i>(Signature)</i></div>	Attest: _____ <div style="text-align: center;"><i>(Signature)</i></div>
Name: _____ <div style="text-align: center;"><i>(Printed or typed)</i></div>	Name: _____ <div style="text-align: center;"><i>(Printed or typed)</i></div>
Title: _____	Title: _____
<i>Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party is considered plural where applicable.</i>	

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:

- 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

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

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.

PAYMENT BOND

Prepared By



Endorsed By



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PAYMENT BOND

<p>Contractor</p> <p>Name: _____</p> <p>Address (<i>principal place of business</i>): _____</p>	<p>Surety</p> <p>Name: _____</p> <p>Address (<i>principal place of business</i>): _____</p>
<p>Owner</p> <p>Name: _____</p> <p>Mailing address (<i>principal place of business</i>): _____</p>	<p>Contract</p> <p>Description (<i>name and location</i>): WWTF Headworks Improvements Project Contract No. 2020-xx</p> <p>Contract Price: _____</p> <p>Effective Date of Contract: _____</p>
<p>Bond</p> <p>Bond Amount: _____</p> <p>Date of Bond: _____ <i>(Date of Bond cannot be earlier than Effective Date of Contract)</i></p> <p>Modifications to this Bond form: <input checked="" type="checkbox"/> None <input type="checkbox"/> See Paragraph 18</p>	
<p>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.</p>	
Contractor as Principal	Surety
_____ <i>(Full formal name of Contractor)</i>	_____ <i>(Full formal name of Surety) (corporate seal)</i>
By: _____ <i>(Signature)</i>	By: _____ <i>(Signature)(Attach Power of Attorney)</i>
Name: _____ <i>(Printed or typed)</i>	Name: _____ <i>(Printed or typed)</i>
Title: _____	Title: _____
Attest: _____ <i>(Signature)</i>	Attest: _____ <i>(Signature)</i>
Name: _____ <i>(Printed or typed)</i>	Name: _____ <i>(Printed or typed)</i>
Title: _____	Title: _____
<p><i>Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party is considered plural where applicable.</i></p>	

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

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

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

00700

GENERAL CONDITIONS

DO NOT REMOVE
THIS PAGE INTENTIONALLY LEFT BLANK

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.

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared By



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STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

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STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

ARTICLE 1—DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

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

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

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

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

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

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

1.02 Terminology

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

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

ARTICLE 2—PRELIMINARY MATTERS

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

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

2.02 *Copies of Documents*

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

2.03 *Before Starting Construction*

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

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

2.04 *Preconstruction Conference; Designation of Authorized Representatives*

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

2.05 *Acceptance of Schedules*

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

2.06 *Electronic Transmittals*

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

ARTICLE 3—CONTRACT DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 *Intent*

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

3.02 *Reference Standards*

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

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

3.03 *Reporting and Resolving Discrepancies*

A. *Reporting Discrepancies*

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

B. *Resolving Discrepancies*

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

3.04 *Requirements of the Contract Documents*

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

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

3.05 *Reuse of Documents*

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

ARTICLE 4—COMMENCEMENT AND PROGRESS OF THE WORK

4.01 *Commencement of Contract Times; Notice to Proceed*

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

4.02 *Starting the Work*

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

4.03 *Reference Points*

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

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

4.04 *Progress Schedule*

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

4.05 *Delays in Contractor's Progress*

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

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

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

5.01 *Availability of Lands*

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

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

5.02 *Use of Site and Other Areas*

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

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

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

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

5.03 *Subsurface and Physical Conditions*

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

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

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

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

- D. *Limitations of Other Data and Documents:* Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto;
2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings;
3. the contents of other Site-related documents made available to Contractor, such as record drawings from other projects at or adjacent to the Site, or Owner's archival documents concerning the Site; or
4. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions, or information.

5.04 *Differing Subsurface or Physical Conditions*

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

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

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

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

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

5.05 *Underground Facilities*

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

3. verifying the actual location of those Underground Facilities shown or indicated in the Contract Documents as being within the area affected by the Work, by exposing such Underground Facilities during the course of construction;
 4. coordination of the Work with the owners (including Owner) of such Underground Facilities, during construction; and
 5. the safety and protection of all existing Underground Facilities at the Site, and repairing any damage thereto resulting from the Work.
- B. *Notice by Contractor:* If Contractor believes that an Underground Facility that is uncovered or revealed at the Site was not shown or indicated on the Drawings, or was not shown or indicated on the Drawings with reasonable accuracy, then Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), notify Owner and Engineer in writing regarding such Underground Facility.
- C. *Engineer's Review:* Engineer will:
1. promptly review the Underground Facility and conclude whether such Underground Facility was not shown or indicated on the Drawings, or was not shown or indicated with reasonable accuracy;
 2. identify and communicate with the owner of the Underground Facility; prepare recommendations to Owner (and if necessary issue any preliminary instructions to Contractor) regarding the Contractor's resumption of Work in connection with the Underground Facility in question;
 3. obtain any pertinent cost or schedule information from Contractor; determine the extent, if any, to which a change is required in the Drawings or Specifications to reflect and document the consequences of the existence or location of the Underground Facility; and
 4. advise Owner in writing of Engineer's findings, conclusions, and recommendations.

During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.

- D. *Owner's Statement to Contractor Regarding Underground Facility:* After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the Underground Facility in question addressing the resumption of Work in connection with such Underground Facility, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations in whole or in part.
- E. *Early Resumption of Work:* If at any time Engineer determines that Work in connection with the Underground Facility may resume prior to completion of Engineer's review or Owner's issuance of its statement to Contractor, because the Underground Facility in question and conditions affected by its presence have been adequately documented, and analyzed on a preliminary basis, then the Engineer may at its discretion instruct Contractor to resume such Work.
- F. *Possible Price and Times Adjustments*
1. Contractor shall be entitled to an equitable adjustment in the Contract Price or Contract Times, to the extent that any existing Underground Facility at the Site that was not shown

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

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

5.06 *Hazardous Environmental Conditions at Site*

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

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

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

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

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

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

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

ARTICLE 6—BONDS AND INSURANCE

6.01 *Performance, Payment, and Other Bonds*

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

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

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

6.02 *Insurance—General Provisions*

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

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

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

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

6.03 Contractor's Insurance

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

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

6.04 *Builder's Risk and Other Property Insurance*

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

6.05 *Property Losses; Subrogation*

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

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

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

6.06 *Receipt and Application of Property Insurance Proceeds*

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

ARTICLE 7—CONTRACTOR'S RESPONSIBILITIES

7.01 *Contractor's Means and Methods of Construction*

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

7.02 *Supervision and Superintendence*

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

7.03 *Labor; Working Hours*

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

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

7.04 *Services, Materials, and Equipment*

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

7.05 *"Or Equals"*

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

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

7.06 *Substitutes*

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

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

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

7.07 *Concerning Subcontractors and Suppliers*

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

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

7.08 *Patent Fees and Royalties*

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

7.09 *Permits*

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

7.10 *Taxes*

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

7.11 *Laws and Regulations*

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

7.12 *Record Documents*

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

7.13 *Safety and Protection*

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

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

7.14 *Hazard Communication Programs*

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

7.15 *Emergencies*

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

7.16 *Submittals*

A. *Shop Drawing and Sample Requirements*

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

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

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

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

D. Resubmittal Procedures for Shop Drawings and Samples

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

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

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

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

7.17 *Contractor's General Warranty and Guarantee*

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

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

7.18 *Indemnification*

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

7.19 *Delegation of Professional Design Services*

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

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

ARTICLE 8—OTHER WORK AT THE SITE

8.01 *Other Work*

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

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

8.02 *Coordination*

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

8.03 *Legal Relationships*

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

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

ARTICLE 9—OWNER'S RESPONSIBILITIES

9.01 *Communications to Contractor*

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

9.02 *Replacement of Engineer*

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

9.03 *Furnish Data*

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

9.04 *Pay When Due*

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

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

ARTICLE 10—ENGINEER'S STATUS DURING CONSTRUCTION

10.01 *Owner's Representative*

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

10.02 *Visits to Site*

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

10.03 *Resident Project Representative*

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

10.04 *Engineer's Authority*

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

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

10.05 *Determinations for Unit Price Work*

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

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

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

10.07 *Limitations on Engineer's Authority and Responsibilities*

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

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

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

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

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

10.08 *Compliance with Safety Program*

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

ARTICLE 11—CHANGES TO THE CONTRACT

11.01 *Amending and Supplementing the Contract*

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

11.02 *Change Orders*

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

11.03 *Work Change Directives*

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

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

11.04 *Field Orders*

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

11.05 *Owner-Authorized Changes in the Work*

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

11.06 *Unauthorized Changes in the Work*

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

11.07 *Change of Contract Price*

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

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

11.08 *Change of Contract Times*

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

11.09 *Change Proposals*

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

B. *Change Proposal Procedures*

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

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

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

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

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

11.10 *Notification to Surety*

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

ARTICLE 12—CLAIMS

12.01 *Claims*

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

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

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

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

13.01 *Cost of the Work*

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

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

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

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

c. *Construction Equipment Rental*

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

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

- g. The cost of utilities, fuel, and sanitary facilities at the Site.
- h. Minor expenses such as communication service at the Site, express and courier services, and similar petty cash items in connection with the Work.
- i. The costs of premiums for all bonds and insurance that Contractor is required by the Contract Documents to purchase and maintain.

C. *Costs Excluded*: The term Cost of the Work does not include any of the following items:

- 1. Payroll costs and other compensation of Contractor's officers, executives, principals, general managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 13.01.B.1 or specifically covered by Paragraph 13.01.B.4. The payroll costs and other compensation excluded here are to be considered administrative costs covered by the Contractor's fee.
- 2. The cost of purchasing, renting, or furnishing small tools and hand tools.
- 3. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
- 4. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
- 5. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.
- 6. Expenses incurred in preparing and advancing Claims.
- 7. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraph 13.01.B.

D. *Contractor's Fee*

- 1. When the Work as a whole is performed on the basis of cost-plus-a-fee, then:
 - a. Contractor's fee for the Work set forth in the Contract Documents as of the Effective Date of the Contract will be determined as set forth in the Agreement.
 - b. for any Work covered by a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price on the basis of Cost of the Work, Contractor's fee will be determined as follows:
 - 1) When the fee for the Work as a whole is a percentage of the Cost of the Work, the fee will automatically adjust as the Cost of the Work changes.
 - 2) When the fee for the Work as a whole is a fixed fee, the fee for any additions or deletions will be determined in accordance with Paragraph 11.07.C.2.
- 2. When the Work as a whole is performed on the basis of a stipulated sum, or any other basis other than cost-plus-a-fee, then Contractor's fee for any Work covered by a Change

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

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

13.02 Allowances

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

13.03 Unit Price Work

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

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

E. *Adjustments in Unit Price*

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

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

14.01 *Access to Work*

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

14.02 *Tests, Inspections, and Approvals*

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

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

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

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

14.03 *Defective Work*

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

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

14.04 *Acceptance of Defective Work*

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

14.05 *Uncovering Work*

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

14.06 *Owner May Stop the Work*

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

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

14.07 Owner May Correct Defective Work

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

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

15.01 Progress Payments

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

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

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

C. *Review of Applications*

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

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

D. *Payment Becomes Due*

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

E. *Reductions in Payment by Owner*

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

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

15.02 *Contractor's Warranty of Title*

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

15.03 *Substantial Completion*

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

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

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

15.04 *Partial Use or Occupancy*

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

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

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

15.05 *Final Inspection*

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

15.06 *Final Payment*

A. *Application for Payment*

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

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

15.07 *Waiver of Claims*

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

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

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

15.08 *Correction Period*

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

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

ARTICLE 16—SUSPENSION OF WORK AND TERMINATION

16.01 *Owner May Suspend Work*

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

16.02 *Owner May Terminate for Cause*

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

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

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

16.03 *Owner May Terminate for Convenience*

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

16.04 *Contractor May Stop Work or Terminate*

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

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

ARTICLE 17—FINAL RESOLUTION OF DISPUTES

17.01 *Methods and Procedures*

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

ARTICLE 18—MISCELLANEOUS

18.01 *Giving Notice*

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

18.02 *Computation of Times*

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

18.03 *Cumulative Remedies*

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

18.04 *Limitation of Damages*

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

18.05 *No Waiver*

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

18.06 *Survival of Obligations*

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

18.07 *Controlling Law*

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

18.08 *Assignment of Contract*

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

18.09 *Successors and Assigns*

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

18.10 *Headings*

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

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SUPPLEMENTARY CONDITIONS

SUPPLEMENTAL GENERAL CONDITIONS

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00830.02-E	CT GENERAL STATUTE 31-55a
00830.02-F	CONTRACTING AGENCY CERTIFICATION FORM
00830.02-G	CONTRACTOR’S WAGE CERTIFICATION FORM
00830.02-H	PAYROLL CERTIFICATION – PUBLIC WORKS PROJECTS
00830.02-I	OCCUPATIONAL CLASSIFICATION BULLETIN
00830.02-J	FOOT NOTES
00860	LIST OF DRAWINGS
00870	INTERIM GUIDANCE FOR MINORITY BUSINESS ENTERPRISE AND WOMENS BUSINESS ENTERPRISE REQUIREMENTS

SUPPLEMENTARY GENERAL CONDITIONS

PART 1 - AMMENDMENTS TO THE GENERAL CONDITIONS

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract (EJCDC Document No. C-700, 2018 edition) and other provisions of the Contract Documents as indicated below. All provisions which are not so amended or supplemented remain in full force and effect.

ARTICLE 1 - DEFINITIONS AND TERMINOLOGY

SC-1.01A.39.

Delete paragraph 1.01.A.39. in its entirety and replace with the following:

39. Specifications - Sections included under Division 1 through Division 16 of the Project Manual.

ARTICLE 2 - PRELIMINARY MATTERS

SC-2.01B. Delivery of Bonds and Evidence of Insurance

Delete paragraph 2.01B. of the General Conditions in its entirety and replace with the following:

B. Before any Work at the site is started, Contractor shall deliver to Owner, with copies to Engineer and each additional insured identified in Article 5 of the Supplementary Conditions, certificates of insurance (and other evidence of insurance which Owner or any additional insured may reasonably request) which Contractor is required to purchase and maintain in accordance with the requirements of Article 5.

SC-2.02A. Copies of Documents

Delete "four" in the first line and replace with "5."

ARTICLE 3 - CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

SC-3.01.B. Intent

Delete Paragraph 3.01.B of the General Conditions and replace with the following paragraphs, which are to read as follows:

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 and the following provisions:

1. In the event of conflicts among the Contract Documents, the Contract Documents shall be construed according to the following priorities, "except as may otherwise be specifically stated" •

- * Highest Priority: Modifications (to the Agreement after the Agreement is executed)
- * Second Priority: Agreement
- * Third Priority: Addenda - later date to take precedence
- * Fourth Priority: Supplementary General Conditions
- * Fifth Priority: General Conditions

* Sixth Priority: Drawings and Specifications

2. If, during the performance of the work, the Contractor finds a conflict, error or discrepancy between or among one or more of the Sections or between or among one or more Sections and the Drawings, the Contractor shall furnish the higher performance requirement. The higher performance requirement shall be considered the equipment, material, device or installation method which represents the most stringent option, the highest quality or the largest quantity.
3. In all cases, figured dimensions shall govern over scaled dimensions, but work not dimensioned shall be as directed by the Engineer and work not particularly shown, identified, sized, or located shall be the same as similar work that is shown or specified.
4. Detailed Drawings shall govern over general drawings, larger scale Drawings take precedence over smaller scale Drawings, Change Order Drawings shall govern over Contract Drawings and Contract Drawings shall govern over Shop Drawings.
5. If the issue of priority is due to a conflict or discrepancy between the provisions of the Contract Documents and any referenced standard, or code of any technical society, organization or association, the provisions of the Contract Documents will take precedence if they are more stringent or presumptively cause a higher level of performance. If there is any conflict or discrepancy between standard specifications, or codes of any technical society, organization or association, or between Laws and Regulations, the higher performance requirement shall be binding on the Contractor, unless otherwise directed by the Engineer.
6. In accordance with the intent of the Contract Documents, the Contractor accepts the fact that compliance with the priority order specified shall not justify an increase in Contract Price or an extension in Contract Time nor limit in any way, the Contractor's responsibility to comply with all Laws and Regulations at all times.

SC-3.01G. Intent

Add a new paragraph immediately after Paragraph 3.01 G. of the General Conditions which is to read as follows:

H. Each and every provision of law and clause required by law to be inserted in these Contract Documents shall be deemed to be inserted herein, and they shall be read and enforced as though it were included herein, and if through mistake or otherwise, any such provision is not inserted, or if not correctly inserted, then upon the application of either party, the Contract Documents shall forthwith be physically amended to make such insertion.

ARTICLE 4 – COMMENCEMENT AN PROGRESS OF THE WORK

SC-4.01A. Commencement of Contract Times; Notice to Proceed

Delete “30th” in the first 1st, 3rd, and 5th lines and replace with “20th”

SC-4.03.A. Reference Points

Delete the first word of paragraph 4.03.A “Owner” and replace with “Contractor”.

Add the following new paragraph immediately after paragraph 4.03.A of the General Conditions which is to read as follows:

B. Engineer may check the lines, elevations, reference marks, batter boards, etc., set by Contractor, and Contractor shall correct any errors disclosed by such check. Such a check shall not be considered as approval of Contractor's work and shall not relieve Contractor of the responsibility for accurate construction of the entire Work. Contractor shall furnish personnel to assist Engineer in checking lines and grades.

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

SC-5.01A. Availability of Lands

Add the following new paragraph immediately after paragraph 5.01.A. of the General Conditions which is to read as follows:

I. If all lands and rights-of-way are not obtained as herein contemplated before construction begins, Contractor shall begin the Work upon such land and rights-of-way as Owner has previously acquired.

ARTICLE 6 – BONDS AND INSURANCE

SC-6.01 .H Performance, Payments, and other Bonds

Add 1 new paragraph immediately after paragraph 6.01 H of the General Conditions which are to read as follows:

I. General: Where certified checks are provided in lieu of Performance Bonds and Payment Bonds on construction and service type contracts, the Owner will require and retain such certified checks in like amounts and for the same duration for which a Performance Bond and Payment Bond would be retained and be in force, that is throughout the specified maintenance or service period, usually one-year after completion of construction or services. Also, in any contract where a maintenance period or service period is not by title specified, then the Owner's Standard Specifications shall apply or, as it may be determined by The OWNER. Performance Bond for the full amount of the total bid, in favor of "The Town of Montville, CT", is required. Payment Bond for the full amount of the total bid, in favor of "The Town of Montville, CT ", is required.

SC-6.02.N Insurance - General Provisions

Add 2 new paragraphs immediately after paragraph 6.02.N of the General Conditions which are to read as follows:

O. Contractor shall provide evidence of its insurance coverage on the certificate of insurance form and shall include the following statement in its entirety in the section of the form entitled "Description of Operations/Locations/Vehicles/Special Items".

‘The Owner, and Martinez Couch and Associates, LLC, and their officers, directors, partners, employees and other consultants and subcontractors are named as additional insureds with respect to the insured's Commercial General Liability and Automobile Liability Insurance Policies. All insurers waive all rights of subrogation against the Owner and Martinez Couch and Associates, LLC, their officers, directors, partners, employees and other consultants and subcontractors. All insurance is primary for all claims covered thereby. Commercial General Liability Insurance includes contractual liability coverage.’

SC-6.03.A. Contractor's Insurance

Delete Paragraph 6.03.A of the General Conditions and replace with the following paragraphs, which are to read as follows:

Required Insurance: The limits of liability for the insurance required by paragraph 6.03 of the General Conditions shall provide coverage for not less than the following amounts or greater where required by law:

The Contractor shall maintain at its own expense during the term of this Contract and any maintenance period provided herein the following insurance covering any claims incurred or arising during the term of or as a result of the Contractor's performance under the Contract which insurance shall be issued by an admitted carrier authorized to do business in the State of Connecticut and having agents upon whom service of process may be made in the State of Connecticut and shall contain at a minimum the following provisions, coverages and policy limits of liability:

The Owner, State of Connecticut, Martinez Couch and Associates, LLC and their respective officers, agents, servants and employees are to be named as additional named insured's on Commercial General Liability and Umbrella Policies.

- a. Commercial General Liability including blanket contractual and products/completed operations coverages. The limits of liability provided shall be no less than One Million Dollars (\$ 1,000,000) each occurrence, One Million Dollars (\$1,000,000) aggregate. X, C and U coverages must be provided if applicable. Per project aggregate must apply. The Owner and the State of CT named additional insured.
- b. Automobile Liability with limits of not less than One Million Dollars (\$ 1,000,000) combined single limit, including coverage for owned, non-owned, hired and/or borrowed vehicles.
- c. Workers' Compensation as required by Connecticut law and Employer's Liability with a limit of not less than One Hundred Thousand Dollars (\$100,000) per occurrence, Five Hundred Thousand Dollars (\$500,000) disease policy limit, and One Hundred Thousand Dollars (\$ 100,000) disease each employee.
- d. Umbrella Liability in excess of Employer's Liability, Commercial General Liability, and Automobile Liability with a limit of not less than Five Million Dollars (\$5,000,000) each occurrence, Five Million Dollars (\$5,000,000) aggregate. Coverage is to be written on a following form basis.
- e. Protective Liability for and in the name of the Owner with a per project minimum limit of liability of not less than One Million Dollars (\$1,000,000) each occurrence and One Million Dollars (\$1,000,000) aggregate. (A copy of policy must be provided).
- f. Environmental Impairment/Pollution Liability covering liability arising out of the pollution or impairment of the environment, including clean-up costs, caused by the performance of the Work of this project of not less than One Million Dollars (\$1,000,000).

The Contractor and/or Subcontractor shall in the case of any blasting activities, provide an endorsement on same to be included on the Comprehensive General Liability policy. Such coverage shall afford the same limits and aggregates and shall be additionally supported by the Umbrella and/or following form Excess Liability Coverage.

The Owner may require proof of financial responsibility and/or other securities if any insurance policy indicates self-insured retention below the minimum level of insurance required by the Contract.

The acceptance by the Owner of certificates indicating the limits of coverage under any policy or policies shall not limit the liability of the Contractor.

The Contractor shall furnish to the Owner a Certificate of Insurance, on Forms Acceptable to the Owner, for each of the above-referenced policies within **ten (10) business days** from the date of its receipt of the notification of award. Failure to do so shall be a default hereunder, entitling the Owner to terminate this Contract. Such certificates must contain information regarding the policies in force, policy numbers, limits, policy periods, and the following provisions; thirty (30) days prior written notice of any material policy change, nonrenewal, or cancellation shall be given to the Owner, by certified mail, except in the event of non-payment of premium, in which case notice will be 10 days. If any insurance policy is cancelled for non-payment of premiums, The OWNER shall have the right to pay any such premiums and deduct the amount thereof from amounts due to the Contractor under the Contract.

The Contractor shall, prior to commencing the Work, also provide to the Owner a statement from the State Treasurer pursuant to Connecticut General Statutes ("C.G.S. ") Section 31-286a that the Contractor is not liable for any workers' compensation payments made pursuant to C.G.S. Section 31-355. The State Treasurer's statement shall be provided to the Owner within fifteen (15) business days from the date of receipt of the notification of award. Failure to do so shall be a default hereunder entitling the Owner to terminate this contract.

SC-6.05.E. Property Losses; Subrogation

Add 1 new paragraph immediately after paragraph 6.05.D of the General Conditions which is to read as follows:

E. All insurance policies provided by the Contractor shall contain provisions to the effect that the insurer waives all rights of subrogation against any of the insured, additional insureds, (and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them) Owner and the Engineer.

SC-6.06C Receipt and Application of Property Insurance Proceeds

Delete paragraph 6.06.C. of the General Conditions in its entirety.

Add the following new paragraphs immediately after paragraph 6.06.C of the General Conditions which are to read as follows:

SC-6.07.A. Acceptance of Bonds and Insurance; Options to Replace

A. If Owner has any objection to the coverage afforded by or other provisions of the insurance required to be purchased and maintained by Contractor in accordance with this Article 6 on the basis of its not complying with the Contract Documents, Owner will notify Contractor in writing thereof within ten (10) days of the date of delivery of such certificates to Owner in accordance with paragraph 2.01. Contractor will provide such additional information in respect of insurance provided by Contractor as Owner may reasonably request.

ARTICLE 7 - CONTRACTOR'S RESPONSIBILITIES

SC-7.03.C. Labor; Working Hours

Add the following new paragraphs immediately after paragraph 7.03.B. of the General Conditions which are to read as follows:

D. Regular working hours are defined as 8 hours per day, Monday through Friday, excluding holidays, between the hours of 7:00 AM and 5:00 PM. Requests to work other than regular working hours shall be submitted to Engineer not less than 48 hours prior to any proposed weekend work or scheduled extended work weeks. Occasional unscheduled overtime on weekdays may be permitted provided two hours notice is given to Engineer.

E. Contractor shall reimburse the Owner for additional engineering and/or inspection costs incurred as a result of overtime work in excess of the regular working hours stipulated in Article SC-7.03.D. At Owner's option, overtime costs may either be deducted from the Contractor's monthly payment request or deducted from the Contractor's retention prior to release of final payment. Overtime costs for the Owner's personnel shall be based on the individual's current overtime wage rate. Overtime costs for personnel employed by the Engineer or Owner's independent testing laboratory shall be calculated in accordance with the terms of their respective contracts with the Owner.

SC-7.03C. Services, Materials, and Equipment

Add the following new paragraphs immediately after paragraph 7.03C. of the General Conditions which are to read as follows:

D. This Agreement is subject to the applicable provisions of the Contract Work Hours and Safety Standards Act, Public Law 87-581, 87th Congress. No Contractor or Subcontractor contracting for any part of the Work shall require or permit any laborer or mechanic to be employed on the Work in excess of forty (40) hours in any work week unless such laborer or mechanic receives compensation at a rate not less than one and one-half times that person's basic rate of pay for all hours worked in excess of forty (40) hours in such work week.

E. Contractor shall employ only competent persons to do the work and whenever Owner shall notify Contractor, in writing, that any person on the Work appears to be incompetent, disorderly, or otherwise unsatisfactory, such person shall be removed from the Project and shall not again be employed on it except with the consent of Owner.

F. Contractor and Subcontractors shall, insofar as practicable, give preference in the hiring of workers for the Project to qualified local residents with first preference being given to citizens of the United States who have served in the armed forces of the United States and have been honorably discharged therefrom or released from active duty therein.

SC-7.07D. Concerning Subcontractors, Suppliers, and Others

Add the following new sentence to the of paragraph 7.07D. the General Conditions to read as follows:

Contractor shall not employ any Subcontractor, Supplier or other person or organization, (including those who are to furnish the principal items of materials or equipment), whether initially or as a substitute, against whom Owner may have reasonable objection.

SC-7.07G. Concerning Subcontractors, Suppliers, and Others

Add the following new sentence to the of paragraph 7.07G. the General Conditions to read as follows:

Acceptance of any Subcontractor, other person or organization by Owner shall not constitute a waiver of any right of Owner to reject defective Work.

SC-7.10A Taxes

Add the following new sentence at the end of paragraph 7.10A of the General Conditions to read as follows:

The materials and supplies to be used in the Work of this Contract are exempt from the Sales and Use Tax of the State of Connecticut. Contractor shall obtain the proper certificates, maintain the necessary records and otherwise comply with the requirements of State of Connecticut.

SC-7.13. Safety and Protection

Add the following paragraphs at the end of paragraph 7.13.J of the General Conditions which are to read as follows:

K. These construction documents, and the joint and several phases of construction hereby contemplated are to be governed, at all times by applicable provisions of the Federal Law(s), including, but not limited to, the latest amendments of the following:

1. Williams-Steiger Occupational Safety and Health Act of 1970, Public Law 91-596;
2. Part 1910 - Occupational Safety and Health Standards; Chapter XVII of Title 29, Code of Federal Regulations;
3. Part 1518 - Safety and Health Regulations for Construction, Chapter XIII of Title 29, Code of Federal Regulations.
4. Part 1910 - Safety and Health Regulations for Construction, Chapter VII of Title 29, Confined Space Entry and Permits as amended.

This project is subject to all of the Safety and Health Regulations (see 29 CFR 1926, as amended) as promulgated by the U.S. Department of Labor on June 24, 1974. Contractors are urged to make themselves familiar with the requirements of these regulations.

L. **Blasting and Explosives:** The Contractor shall abide by all applicable regulations governing blasting when approved for use by the or Owner in addition to the following:

1. **Blasting Precautions**
 - a. Blasting shall be conducted with all possible care in order to avoid injury to persons and property. The blasting area shall be well-covered, and a sufficient warning shall be given to all persons in the vicinity of the work before blasting.
 - b. The explosives used shall be of such power and placed in such quantities and positions that will not make the excavation unduly large nor shatter unduly the rock upon or against which the work is to be installed nor injured the work already in place. Where masonry is to be built against the rock, all loose or shattered rock shall be completely removed so the masonry can be built firmly in contact with the solid rock.
 - c. Contractor's attention is directed to the fact of the proximity of gas lines, water lines and telephone ducts. Extreme caution must be utilized so as not to damage or disrupt these utilities. Any damage or disruption costs resulting from blasting shall be borne by the Contractor.
2. **Pre-blast Survey:**
 - a. Prior to any blasting, the Contractor shall submit to the Owner, a Pre-Blast Condition survey of all structures located within 200 feet of any proposed blasting and all wells abutting the project areas within 1,000 feet of the proposed blasting area.

- b. Contractor shall retain the services of a laboratory certified by the State of Connecticut to prepare test on all wells abutting the project areas as well as all wells located within 1,000 feet of the blasting area. The test reports shall be furnished to the Owner prior to any blasting on the project and shall contain data on water levels measured with the well shutdown and water quality as required by the regional health department, and the State of Connecticut Department of Environmental Protection. Costs for the above shall be borne by the Contractor.
 - a. Explosives must be carefully transported, stored, handled and used as required by Federal Laws (Occupational Safety and Health Act) the several local and State ordinances and laws, and the necessary permits for such transportation, storage, handling and use shall be obtained by the Contractor who shall show such permits to the Owner before any blasting will be allowed. The Contractor shall keep on the job only such quantity of explosives as may be needed for the work underway and only during such time as they are being used. Explosives shall be stored in a secure manner and separately from all tools. Caps or detonators shall be stored separately and at a point over 100 feet distant from the explosives. Receptacles especially constructed for use in the storage of explosives shall be provided for the storage of explosives and they shall be proof against bullets, fire or other conditions that might cause explosion of the contents. When the need for explosives ceases, all such material remaining on the job shall be promptly removed from the premises.
 - b. Under any circumstances, the approval of the Owner shall first be obtained before blasting is permitted and where, in the opinion of the Owner, blasting is unsafe or dangerous to persons or to existing structures and utilities. Contractor shall employ pneumatic tools, drilling and splitting mechanically or by hand or by other means not requiring the use of explosives for the removal of rock, boulders or ledge, at no additional expense to the Owner. Under no circumstance shall pre-blasting be allowed.
 - c. Before any explosives, such as dynamite or detonator caps, are stored or used at the site or sites of construction under this contract, Contractor shall contact the Fire Department of the Owner, for instructions relative to the regulations for possession and use of explosives in the Municipality where the project is located.
 - d. Contractor shall obtain all required permits or licenses for possession and use of explosives on the site or sites of construction under this contract. In addition, the Contractor shall be responsible:
 - i. To provide a man who shall be responsible for the explosive materials at all times;
 - ii. For the keeping of records which shall show by date the explosive materials delivered to the site or sites of construction, the explosive materials used for construction and the explosive materials removed from the site or sites of construction under this contract;
 - iii. For the non-storage of explosive materials overnight on the site or sites of construction under this contract;
 - iv. For the immediate reporting to the Fire Department of the Municipality of all unaccounted-for explosive materials.
7. All records relating to the possession and use of explosive materials under this contract shall be open to inspection by the Police and Fire Departments of the Owner, at any time.

8. The use of explosives on State-owned and privately-owned properties shall be subject to all additional requirements as may be required by the above-mentioned property owners.
9. In addition to other requirements specified and all other necessary or required precautionary measures, the Contractor shall be held responsible for completely, adequately and carefully covering all blasts with suitable blasting mats in such a manner as to prevent damage to landscape features, structures, utilities or other surrounding objects and in a manner that will prevent injury to persons.
10. The use of the maximum number of drillholes, together with minimum quantities of explosives in each drill hole and utilizing split-second delayed caps is the preferable method of accomplishing the blasting operations in conjunction with rock excavation.
11. Contractor shall keep blasting logs of all his/her blasting operations. The blasting logs shall include all pertinent information with respect to the blasting operations including personnel, times, locations, description of charges, methods, details of blasting patterns and excavations, and such other information as may be required. Contractor shall furnish to the Owner each day, in which blasting operations are preformed, certified copies of the Contractor's blasting logs covering all of his/her blasting operations.
12. Unless specifically permitted, no blasting shall be done between the hours of sunset and sunrise on any day and no blasting will be allowed on Sundays or legal holidays.
13. In the event that any provisions in this are contrary to or inconsistent with the above referred to Occupational Safety and Health Act, provisions of the Occupational Safety and Health Act shall prevail. For additional requirements see the applicable Technical Specification "Trench Excavation, Rock and Earth Refill" of these Specifications.

SC-7.15.A. Emergencies

Delete the last sentence in paragraph 6.16A. of the General Conditions in its entirety and replace with the following:

If Engineer determines that the incident giving rise to the emergency action was not the responsibility of the Contractor and that a change in the Contract Document is required because of the action taken by the Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

SC-7.18A. Indemnification

Delete paragraph 7.18.A. of the General Conditions in its entirety and replace with the following:

A. To the fullest extent permitted by Laws and Regulations, Contractor shall defend, indemnify and hold harmless Owner, Engineer and Related Entity 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 performance of the Work, provided that any such claim, cost or loss or damage:

1. is attributable to bodily injury, sickness, disease or death or to injury to or destruction of tangible property (other than the Work itself, including the loss of use resulting therefrom; and
2. is caused in whole or in part 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, regardless of whether or not caused in part by any negligence or omission of an individual or entity indemnified hereunder or whether liability is imposed upon such indemnified party by Laws and Regulations regardless of the negligence of any such indemnified party unless caused by the sole negligence of a party indemnified hereunder.. If through the acts of neglect on the part of Contractor, any other contractor or any Subcontractor shall suffer loss or damage on the Work, Contractor shall settle with such other contractor or Subcontractor by agreement or arbitration if such other contractor or Subcontractor will so settle. If such other contractor or Subcontractor shall assert any claim against Owner and/or Engineer, or the Related Entity of each on account of any damage alleged to have been sustained, Owner shall notify Contractor, who shall indemnify and save harmless Owner, Engineer, and the Related Entity of each against any such claims.

3. Contractor shall at all times indemnify and save harmless the Owner, any municipality included therein, the State of Connecticut, Martinez Couch and Associates, LLC and their respective officers, agents and servants on account of any and all claims, damages, losses, litigation, expenses, counsel fees and compensation: (a) arising out of injuries (including death) sustained by or alleged to have been sustained by the servants, employees or agents of the Owner, any municipality included therein, the State of Connecticut, Martinez Couch and Associates, LLC or the Contractor, its subcontractors or material suppliers; and (b) arising out of injuries (including death) sustained by or alleged to have been sustained by the public, any or all persons on or near the Work, or by any other person or property, real or personal (including property of the Owner) caused in whole or in part by the acts or omissions of the Contractor, any subcontractor, material suppliers or anyone directly or indirectly employed by them or any of them while engaged in the performance of this Contract and including any maintenance period.
4. Contractor shall indemnify and save harmless the Owner, any municipality included therein, the State of Connecticut, Martinez Couch and Associates, LLC and its officers and agents from all claims for payment of labor used on and materials furnished for the Work, including taxes applicable thereto, all claims for damages sustained or alleged to be sustained in consequence of any improper materials, implements or labor used, or resulting from any violation by the Contractor, its employees, subcontractors, material suppliers or agents of any law, municipal ordinance or any regulation, decree or order of any governmental agency having jurisdiction over the Work or any part thereof, or because of pauper or indigent employees brought to any city or town for the performance of the Contract and having no settlement therein and all claims against the Owner, any municipality included therein, the State of Connecticut, Martinez Couch and Associates, LLC for alleged infringement of patents by the Owner, any municipality included therein, the State of Connecticut, Martinez Couch and Associates, LLC or by reason of any method of construction used in the Work or the use of any appliance, process, apparatus or material which may be furnished under this Contract.

SC-7.19.F Delegation of Professional Design Services

Delete paragraph 7.19.F of the General Conditions in its entirety and replace with the following:

F. Contractor shall not be responsible for the adequacy of the performance criteria or design criteria contained in the Contract Documents.

SC-7.20

Add the following paragraph at the end of paragraph 7.19 of the General Conditions:

7.20 Excavations Near Underground Utility Facilities

A. GENERAL

1. In compliance with the State of Connecticut Public Act No. 87-71 and section 16-345 of the Regulations of Connecticut State Agencies and any modifications or updates thereto, "An Act Concerning Excavations Near Underground Utility Facilities", the Contractor shall not start any kind of excavation and/or blasting of rock activity near the location of any kind of public utility facility without having first ascertained the location of all such utilities in the area.
2. For this, he shall notify CBYD (Call Before You Dig, Inc.) (Toll Free No. 1-800-922-4455) at least two (2) full working days in advance (excluding Saturday, Sunday and Holidays), but not more than one (1) month before starting any such work. Such notice shall include the name, address and telephone number of the person/agency performing the work and the date and type of excavation. The CBYD will immediately transmit such information to the Utility Companies whose facilities may be affected. Utility Companies receiving notice shall mark-up the locations of their utilities on site and/or inform the Contractor if they do not have their utilities in the area. If the Contractor does not receive any information or mark-up of the locations on site, he shall contact CBYD and verify if the Utility Companies have responded to his/her call. Under no circumstances, shall the Contractor be allowed to start any kind of excavation and/or blasting work prior to his/her obtaining all the necessary information regarding the location of underground utilities at the site. It will be the Contractor's responsibility to contact and have all utilities marked on site prior to starting the work. Contractor shall coordinate construction activities with all Utility Company Facility relocations and replacements. Contractor shall provide adequate support and protection of all existing facilities in accordance with Utility Co. standard. All utility relocations and replacements on Municipal property shall be paid for by the respective utility company. All utility facility relocations and replacements on private property shall be at the Contractor's expense.
3. In addition to contacting the CBYD, the Contractor shall also contact the applicable water company 48 hours prior to any blasting of rock or work in close proximity to the water main facilities.
4. The contract drawings may not indicate all subsurface structures or utilities. Contractor shall make all investigations including exploratory excavations, by hand digging, as he deems necessary to uncover and determine the exact locations of utilities and structures and shall have no claims for damages due to encountering subsurface structures or utilities.

B. RELATION TO WATER MAINS

1. The sanitary sewer must be laid with at least 10 feet horizontal or 18 inches vertical separation from any existing or proposed water main, and in accordance with "Guides for the Design of Wastewater Treatment Works", prepared by the NEIWPCC, latest edition, and the Connecticut Department of Health Services requirements. Whenever possible the sanitary sewer pipe shall cross below existing water mains. Should local conditions prevent such separations, a sewer may be laid closer if:

- a. Both the sewer and water main are constructed of ductile iron or C900 PVC pipe with rubber compression gaskets. At a crossing this condition shall be met for a distance of 10 feet on each side of the water main. One full length of sewer pipe shall be centered on the water main so that both sewer joints will be as far from the water main as possible. Pipelines shall be installed in accordance with AWWA C600, latest revision. Sewer pipe shall be pressure tested in accordance with the applicable sections concerning cement-lined ductile iron sewer pipe of the Technical Specifications.

or

- b. The sewer line shall be encased in concrete for the entire length in which the separations are not met. At a crossing the sewer line shall be encased in concrete for a distance of 10 feet on each side of the water main.

or

- c. The water main shall be relocated by the utility company, and at their expense, to provide the required separation and reconstructed with rubber compression gasket joint pipe. At a crossing this condition shall be met for a distance of 10 feet on each side of the sewer. One full length of water main should be centered over the sewer so that both joints will be as far from the sewer as possible.

C. GAS PIPELINES

1. Forty-eight (48) hours prior notice must be given by the Contractor to the respective Gas Company before starting construction of sewer pipelines in the vicinity of gas lines.

D. WATER

1. The Contractor shall provide and maintain facilities for an adequate supply of water suitable for use for construction purposes and for domestic use as required for the work of this contract. All work, materials, equipment, appurtenances and accessories necessary for providing supplies of water at the site and including the cost of all water used, shall be borne by the Contractor. Upon completion of the work of this contract, and before final acceptance, the Contractor shall remove all temporary piping and appurtenant work used for temporary water supply. Temporary water supply work shall be provided in accordance with the requirements of the governing Water Department and health authorities. The Contractor shall be responsible for providing all necessary water for construction purposes and for his/her potable use.

Add the following paragraph at the end of paragraph 7.20 of the General Conditions:

7.21 Sanitary Regulations

- A. Adequate sanitary conveniences for use of workers on the premises, properly secluded from public observation, shall be provided and maintained by the Contractor in accordance with the requirements of local and State health authorities and in such manner and at such points as shall be approved and their use shall be strictly enforced. Sanitary waste shall be treated and disposed of in a manner satisfactory to and as directed by the Owner and the local and State health authorities; under no circumstances shall sanitary wastes be allowed to flow on the surface of the ground.
- B. Contractor shall rigorously prohibit the committing of nuisances upon the lanes or rights-of-way of the Owner, about the work or upon adjacent public or private property.

- C. The cost of the sanitary conveniences and maintaining same will not be paid for separately, but compensation will be considered to be included in the prices stipulated for the appropriate items of work as listed in the bid.

ARTICLE 9. OWNER'S RESPONSIBILITIES

SC-9.06 Insurance

Delete paragraph 9.06 of the General Conditions in its entirety.

ARTICLE 10 - ENGINEER'S STATUS DURING CONSTRUCTION

SC-10.03B. Project Resident Representative

Add the following new paragraph immediately after paragraph 10.03B. of the General Conditions which is to read as follows:

- C. Engineer will furnish a Resident Project Representative and assistants to assist Engineer in observing the performance of the Work. The duties and responsibilities of the Resident Project Representative will be as enumerated in the Engineer's Contract and will be made available to Contractor at the start of the Work.

ARTICLE 11 - CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIME

SC-11.07.B.2. Change of Contract Price

Delete paragraph 11.07B.2, of the General Conditions in its entirety.

SC-11.07.C.1. Contractor's Fee

Delete paragraph 11.07C.1. of the General Conditions in its entirety.

SC-11.07C.2.b. Contractor's Fee

In the second line of paragraph 11.07C.2.b., before the semicolon add the following words "based on subcontractor's Cost of the Work";

ARTICLE 12 – CLAIMS

SC-12.01A.4. Methods and Procedures

Add a new paragraph immediately following paragraph 12.01A.4 of the General Conditions which is to read as follows:

5. Contractor shall carry on the Work and maintain the progress schedule during the dispute resolution proceedings, unless otherwise agreed by Contractor and Owner in writing.

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

SC-13.01.B.1. Cost of the Work

Delete the second sentence in paragraph 13.01.B.1. of the General Conditions in its entirety and replace with the following:

Such employees shall include one foremen (unless agreed upon prior to beginning Work).

Add the following new paragraph immediately after paragraph 13.01.B. 1. of the General Conditions which is to read as follows:

a. Contractor shall establish, in the Agreement, the Direct Labor Cost percentage. This percentage, where approved by Owner, will be used in the determination of the Direct Labor Cost listed in the Change Order Form included in Part II of the Supplementary Conditions. The Direct Labor Costs are defined to include social security contributions, unemployment, excise and payroll taxes, workers' and workmen's compensation, health and retirement benefits, sick leave, vacation and holiday pay, and cost of premiums for all additional insurance required because of changes in the Work.

SC-13.02A. Allowances

Delete paragraphs 13.02A. through D. of the General Conditions in their entirety.

SC-13.03E. Unit Price Work

Delete paragraph 13.03E. of the General Conditions in its entirety and replace with the following:

E. The unit price of an item of Unit Price Work shall not be subject to re-evaluation and adjustment.

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

SC-14.06A. Owner May Stop the Work

Add the following new paragraph immediately after paragraph 14.06A. of the General Conditions to read as follows:

B. If Owner stops Work under Paragraph 14.06A., Contractor shall be entitled to no extension of Contract Time or increase in Contract Price.

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

SC- 15.01B.4 Application for Payments

Add a new paragraph immediately after paragraph 15.01B.4 of the General Conditions which is to read as follows:

5. Contractor shall furnish evidence that payment received on the basis of materials and equipment not incorporated and suitably stored, has in fact been paid to the respective supplier(s) within sixty (60) days of payment by Owner. Failure to provide such evidence of payment may result in the withdrawal of previous approval(s) and removal of the cost of related materials and equipment from the next submitted Application for Payment.

SC-15.01D.1. Payment Becomes Due

Delete paragraph 15.01D.1. of the General Conditions and add new paragraphs which are to read as follows:

1. Forty-Five (45) days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended will (subject to the provisions of Paragraph 14.02.E) become due; and when due will be paid by Owner to Contractor.

2. Should Contractor neglect to pay any undisputed claims, made in writing to Owner within thirty (30) days after completion of the Work, but continuing unsatisfied for a period of ninety (90) days, Owner may

pay such claim and deduct the amount thereof from the balance due Contractor. Owner may also, with the written consent of Contractor, use any monies retained, due, or to become due under this Contract for the purpose of paying for both labor and materials for the Work, for which claims have not been filed.

3. Security is provided both by the Payment Bond and the power of Owner to retain any monies for claims, but payment by one shall in no way impair or discharge the liability of the other.

4. Any and all liens for work and materials may be paid off by Owner within a reasonable time after filing for record in accordance with State and local laws, a notice of such liens except where the claim on which the lien is filed is being litigated by Contractor, and in such case Owner may pay the amount of any final judgment or decree or any such claim within a reasonable time after such final judgment or decree shall be rendered.

5. All monies paid by Owner in settlement of liens as aforesaid, with the costs and expenses incurred by Owner in connection therewith, shall be charged to Contractor, shall bear interest at the rate of three percentage points above the rediscount rate then charged by the Federal Reserve Bank, and shall be deducted from the next payment due Contractor under the terms of this Contract.

SC-15.02A. Contractor's Warranty of Title

Add the following new paragraphs immediately after paragraph 15.02A. of the General Conditions which are to read as follows:

B. No materials or supplies for the Work shall be purchased by Contractor or Subcontractor subject to any chattel mortgage or under a conditional sale contract or other agreement by which an interest is retained by the seller. Contractor warrants that Contractor has good title to all materials and supplies used by Contractor in the Work, free from all liens, claims or encumbrances.

C. Contractor shall defend, indemnify and save Owner and Engineer harmless from all claims growing out of the lawful demands of Subcontractors, laborers, workmen, mechanics, materialmen, and furnishers of machinery and parts thereof, equipment, power tools, and all supplies, including commissary, incurred in the furtherance of the performance of this Contract. Contractor shall at Owner's request, furnish satisfactory evidence that all obligations of the nature hereinabove designated have been paid, discharged, or waived. If Contractor fails to do so, then Owner may, after having served written notice on the said Contractor either pay unpaid bills, of which Owner has written notice, direct, or withhold from the Contractor's unpaid compensation a sum of money deemed reasonably sufficient to pay any and all such lawful claims until satisfactory evidence is furnished that all liabilities have been fully discharged whereupon payment to Contractor shall be resumed, in accordance with the terms of this Contract, but in no event shall the provisions of this sentence be construed to impose any obligations upon Owner to either Contractor or Contractor's Surety. In paying any unpaid bills of the Contractor, Owner shall be deemed the agent of Contractor and any payment so made by Owner shall be considered as payment made under the Contract by Owner to Contractor and Owner shall not be liable to Contractor for any such payment made in good faith.

SC-15.07B. Engineer's Review of Application for Acceptance

Delete paragraph 15.07B. of the General Conditions in its entirety and replace with the following:

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 - all as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other

obligations under the Contract Documents have been fulfilled, Engineer will indicate in writing Engineer's recommendation of payment and present the Application to Owner for payment. Such recommendation will account for any setoffs against payment that are necessary in Engineer's opinion to protect Owner from loss for the reasons stated above with respect to progress payments. Thereupon Engineer will give written notice to Owner and Contractor that the Work is acceptable subject to the provisions of paragraph 15.07. Otherwise, Engineer will return the Application 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. If the Application and accompanying documentation are appropriate as to form and substance, Owner shall in accordance with the applicable State or local General Law, pay Contractor the amount recommended by Engineer.

ARTICLE 16 - SUSPENSION OF WORK AND TERMINATION

SC-16.02A.4. Owner May Terminate for Cause

Add the following new paragraph immediately after paragraph 16.02A.4. of the General Conditions which is to read as follows:

5. If Contractor abandons the Work, or sublets this Contract or any part thereof, without the previous written consent of Owner, or if the Contract or any claim thereunder shall be assigned by Contractor otherwise than as herein specified;

ARTICLE 18 - MISCELLANEOUS

SC-18.10 – Headings

Add the following new paragraphs immediately after paragraph 18.10 of the General Conditions:

18.11 Addresses

A. Both the address given in the Bid Form upon which this Agreement is founded, and Contractor's office at or near the site of the Work are hereby designated as places to either of which notices, letters, and other communications to Contractor shall be certified, mailed, or delivered. The delivering at the above named place, or depositing in a postpaid wrapper directed to the first-named place, in any post office box regularly maintained by the post office department, of any notice, letter or other communication to Contractor shall be deemed sufficient service thereof upon Contractor; and the date of said service shall be the date of such delivery or mailing. The first-named address may be changed at any time by an instrument in writing, executed and acknowledged by Contractor, and delivered to Owner and Engineer. Nothing herein contained shall be deemed to preclude or render inoperative the service of any notice, letter, or other communication upon Contractor personally.

18.12 Wage Rates

A. The requirements and provisions of all applicable laws and any amendments thereof or additions thereto as to the employment of labor, and to the schedule of minimum wage rates established in compliance with laws shall be a part of these Contract Documents. Copies of the wage schedules are included in PART II of these Supplementary Conditions. If, after the Notice of Award, it becomes necessary to employ any person in a trade or occupation not classified in the wage determinations, such person shall be paid at not less than such rates as shall be determined by the officials administering the laws mentioned above. Such approved minimum rate shall be retroactive to the time of the initial employment of such person in such trade or occupation. Contractor shall notify Owner of Contractor's intention to employ persons in trades or

occupations not classified in sufficient time for Owner to obtain approved rates for such trades or occupations

B. The schedules of wages referred to above are minimum rates only, and Owner will not consider any claims for additional compensation made by Contractor because of payment by Contractor of any wage rate in excess of the applicable rate contained in these Contract Documents. All disputes in regard to the payment of wages in excess of these specified in the schedules shall be resolved by Contractor.

C. The said schedules of wages shall continue to be the minimum rates to be paid during the life of this Agreement and a legible copy of said schedules shall be kept posted in a conspicuous place at the site of the Work.

18.13 Revenue Services Certificate and State Treasurer Statement

A. COMMISSIONER OF REVENUE SERVICES CERTIFICATE. The successful bidder, if a non-resident contractor shall obtain prior to commencing the Work a certificate from the Commissioner of Revenue Services that the requirements of C.G.S. Section 12-430(7), which require a non-resident contractor to deposit a sum equivalent to five percent (5%) of the total amount of the contract or a guaranty bond in a like amount with the Commissioner of Revenue Services to secure payment of the sales and use tax, have been met or do not apply to the Work.

B. In addition, the successful bidder, if a non-resident contractor, must comply with the conditions set forth in C.G.S. Section 31-225 (I) regarding the filing of a bond with the Labor Commissioner to secure the payment of unpaid unemployment compensation contributions, interest and penalties due and attributable to the Work and must submit proof such compliance prior to commencing the Work.

C. STATEMENT OF STATE TREASURER. The successful bidder shall provide to the Owner a statement from the State Treasurer pursuant to Connecticut General Statutes ("C.G.S. Section 31-286a that the successful bidder is not liable for any workers' compensation payments made pursuant to C.G.S. Section 31-355.

PART 2 - STATE AND LOCAL PROVISIONS

Federal, State and Local Government Provisions included herein, have been selected from those to which specific references have been made elsewhere in the Contract Documents. Each and every other provision of law or clause required by law to be inserted in this Contract shall be deemed to be also inserted herein in accordance with paragraph 3.01 H of the Supplementary Conditions.

PART II – STATE AND LOCAL
CONTRACT PROVISIONS

DOCUMENT 00820.01-A1

REQUIRED CONNECTICUT GENERAL STATUTES (SECTION 4a-60)

The following subsections are set forth here as required by section 4a-60 of the Connecticut General Statutes and shall be set forth in all Subcontracts:

(a) The contractor agrees and warrants that in the performance of the contract such contractor will not discriminate or permit discrimination against any person or group of persons on the grounds of race, color, religious creed, age, marital status, national origin, ancestry, sex, mental retardation, mental disability or physical disability, including, but not limited to, blindness, unless it is shown by such contractor that such disability prevents performance of the work involved, in any manner prohibited by the laws of the United States or of the State of Connecticut. The contractor further agrees to take affirmative action to insure that applicants with job-related qualifications are employed and that employees are treated when employed without regard to their race, color, religious creed, age, marital status, national origin, ancestry, sex, mental retardation, mental disability or physical disability, including, but not limited to, blindness, unless it is shown by such contractor that such disability prevents performance of the work involved; (1) the contractor agrees, in all solicitations or advertisements for employees placed by or on behalf of the contractor, to state that it is an "affirmative action-equal opportunity employer" in accordance with regulations adopted by the commission; (3) the contractor agrees to provide each labor union or representative of workers with which such contractor has a collective bargaining agreement or other contract or understanding and each vendor with which such contractor has a contract or understanding, a notice to be provided by the commission advising the labor union or workers' representative of the contractor's commitments under this section, and to post copies of the notice in conspicuous places available to employees and applicants for employment; (4) the contractor agrees to comply with each provision of this section and sections 46a-68e and 46a-68f and with each regulation or relevant order issued by said commission pursuant to sections 46a-56, 46a-68e and 46a-68f; (5) the contractor agrees to provide the Commission on Human Rights and Opportunities with such information requested by the commission, and permit access to pertinent books, records and accounts, concerning the employment practices and procedures of the contractor as relate to the provisions of this section and section 46a-56.

(b) If the contract is a public works contract, the contractor agrees and warrants that he will make good faith efforts to employ minority business enterprises as subcontractors and suppliers of materials on such public works project.

The following subsections are set forth herein as required by section 4a-60a of the Connecticut General statutes and shall be set forth in all Subcontracts:

(1) The contractor agrees and warrants that in the performance of the contract such contractor will not discriminate or permit discrimination against any person or group of persons on the grounds of sexual orientation, in any manner prohibited by the laws of the United States or of the State of Connecticut, and that employees are treated when employed without regard to their sexual orientation; (2) the contractor agrees to provide each labor union or representative of workers with which such contractor has a collective bargaining agreement

or other contract or understanding and each vendor with which such contractor has a contract or understanding, a notice to be provided by the Commission on Human Rights and Opportunities advising the labor union or workers' representative of the contractor's commitments under this section, and to post conspicuous places available to employees and applicants for employment; (3) the contractor agrees to comply with each provision of this section and with each regulation or relevant order issued by said commission pursuant to section 46a-56; and (4) the contractor agrees to provide the Commission on Human Rights and Opportunities with such information requested by the commission, and permit access to pertinent books, records and accounts, concerning the employment practices and procedures of the contractor which relate to the provisions of this section and section 46a-56.

Executive Orders of the Governor

This Contract and all Subcontracts are subject to the provisions of Executive Order No. Three of Governor Thomas J. Meskill, promulgated June 16, 1971, concerning labor employment practices, Executive Order No. Seventeen of Governor Thomas J. Meskill, promulgated February 15, 1973, concerning the listing of employment openings and Executive Order No. Sixteen of Governor John G. Rowland promulgated August 4, 1999, concerning violence in the workplace, all of which are incorporated into and are made a part of this Contract as if they had been fully set forth in it. This provision shall be set forth and incorporated in all Subcontracts.

STATE AND LOCAL PROVISIONS

Federal, State and Local Government Provisions included herein, have been selected from those to which specific references have been made elsewhere in the Contract Documents. Each and every other provision of law or clause required by law to be inserted in this Contract shall be deemed to be also inserted herein in accordance with paragraph 3.01D of the General Conditions.

Education, Welfare, and Public Health Tax (Sales and Use Tax)

The CONTRACTOR's attention is called to Regulation 12-426-18 as amended, promulgated by the Sales and Use Tax Division of the State Department of Revenue Services, which provided for the exemption of the sales and use tax on the purchase of such materials and supplies as are to be physically incorporated in and become a permanent part of the project being performed under this contract. The CONTRACTOR may avail himself of the savings of this tax and shall take this exemption into account in calculating his bid for this work. The CONTRACTOR or Subcontractor shall furnish his suppliers with a completed certificate using the Department of Revenue Services CERT-141 Form attached in Section 00820.A2.

This document contains the Connecticut regulations for Connecticut General Statute Section 4a-60). This is not the official version of the regulations. The official regulations are published by the State of Connecticut, Judicial Branch, Commission on Official Legal Publications in the Connecticut Law Journal. In the event there is inconsistency between this document and the regulations as published in the Connecticut Law Journal, the Connecticut Law Journal publication will serve as the official version.

Sec. 4a-60. (Formerly Sec. 4-114a). Nondiscrimination and affirmative action provisions in awarding agency, municipal public works and quasi-public agency project contracts.

(a) Except as provided in section 10a-151i, every contract to which an awarding agency is a party, every quasi-public agency project contract and every municipal public works contract shall contain the following provisions:

- (1) The contractor agrees and warrants that in the performance of the contract such contractor will not discriminate or permit discrimination against any person or group of persons on the grounds of race, color, religious creed, age, marital status, national origin, ancestry, sex, gender identity or expression, status as a veteran, intellectual disability, mental disability or physical disability, including, but not limited to, blindness, unless it is shown by such contractor that such disability prevents performance of the work involved, in any manner prohibited by the laws of the United States or of the state of Connecticut; and the contractor further agrees to take affirmative action to ensure that applicants with job-related qualifications are employed and that employees are treated when employed without regard to their race, color, religious creed, age, marital status, national origin, ancestry, sex, gender identity or expression, status as a veteran, intellectual disability, mental disability or physical disability, including, but not limited to, blindness, unless it is shown by such contractor that such disability prevents performance of the work involved;
- (2) The contractor agrees, in all solicitations or advertisements for employees placed by or on behalf of the contractor, to state that it is an “affirmative action-equal opportunity employer” in accordance with regulations adopted by the Commission on Human Rights and Opportunities;
- (3) The contractor agrees to provide each labor union or representative of workers with which such contractor has a collective bargaining agreement or other contract or understanding and each vendor with which such contractor has a contract or understanding, a notice to be provided by the Commission on Human Rights and Opportunities advising the labor union or workers' representative of the contractor's commitments under this section, and to post copies of the notice in conspicuous places available to employees and applicants for employment;
- (4) The contractor agrees to comply with each provision of this section and sections 46a-68e and 46a-68f and with each regulation or relevant order issued by said commission pursuant to sections 46a-56, 46a-68e, 46a-68f and 46a-86; and
- (5) The contractor agrees to provide the Commission on Human Rights and Opportunities with such information requested by the commission, and permit access to pertinent books, records and accounts, concerning the employment practices and procedures of the contractor as relate to the provisions of this section and section 46a-56.

(b) If the contract is a public works contract, municipal public works contract or contract for a quasi-public agency project, the contractor agrees and warrants that he or she will make good

faith efforts to employ minority business enterprises as subcontractors and suppliers of materials on such public works or quasi-public agency project.

(c) Except as provided in section 10a-151i:

- (1) Any contractor who has one or more contracts with an awarding agency or who is a party to a municipal public works contract or a contract for a quasi-public agency project, where any such contract is valued at less than fifty thousand dollars for each year of the contract, shall provide the awarding agency, or in the case of a municipal public works or quasi-public agency project contract, the Commission on Human Rights and Opportunities, with a written or electronic representation that complies with the nondiscrimination agreement and warranty under subdivision (1) of subsection (a) of this section, provided if there is any change in such representation, the contractor shall provide the updated representation to the awarding agency or commission not later than thirty days after such change.
- (2) Any contractor who has one or more contracts with an awarding agency or who is a party to a municipal public works contract or a contract for a quasi-public agency project, where any such contract is valued at fifty thousand dollars or more for any year of the contract, shall provide the awarding agency, or in the case of a municipal public works or quasi-public agency project contract, the Commission on Human Rights and Opportunities, with any one of the following:
 - (A) Documentation in the form of a company or corporate policy adopted by resolution of the board of directors, shareholders, managers, members or other governing body of such contractor that complies with the nondiscrimination agreement and warranty under subdivision (1) of subsection (a) of this section;
 - (B) Documentation in the form of a company or corporate policy adopted by a prior resolution of the board of directors, shareholders, managers, members or other governing body of such contractor if (i) the prior resolution is certified by a duly authorized corporate officer of such contractor to be in effect on the date the documentation is submitted, and (ii) the head of the awarding agency, or a designee, or in the case of a municipal public works or quasi-public agency project contract, the executive director of the Commission on Human Rights and Opportunities or a designee, certifies that the prior resolution complies with the nondiscrimination agreement and warranty under subdivision (1) of subsection (a) of this section; or
 - (C) Documentation in the form of an affidavit signed under penalty of false statement by a chief executive officer, president, chairperson or other corporate officer duly authorized to adopt company or corporate policy that certifies that the company or corporate policy of the contractor complies with the nondiscrimination agreement and warranty under subdivision (1) of subsection (a) of this section and is in effect on the date the affidavit is signed.

- (3) No awarding agency, or in the case of a municipal public works contract, no municipality, or in the case of a quasi-public agency project contract, no entity, shall award a contract to a contractor who has not provided the representation or documentation required under subdivisions (1) and (2) of this subsection, as applicable. After the initial submission of such representation or documentation, the contractor shall not be required to resubmit such representation or documentation unless there is a change in the information contained in such representation or documentation. If there is any change in the information contained in the most recently filed representation or updated documentation, the contractor shall submit an updated representation or documentation, as applicable, either (A) not later than thirty days after the effective date of such change, or (B) upon the execution of a new contract with the awarding agency, municipality or entity, as applicable, whichever is earlier. Such contractor shall also certify, in accordance with subparagraph (B) or (C) of subdivision (2) of this subsection, to the awarding agency or commission, as applicable, not later than fourteen days after the twelve-month anniversary of the most recently filed representation, documentation or updated representation or documentation, that the representation on file with the awarding agency or commission, as applicable, is current and accurate.
- (d) For the purposes of this section, “contract” includes any extension or modification of the contract, “contractor” includes any successors or assigns of the contractor, “marital status” means being single, married as recognized by the state of Connecticut, widowed, separated or divorced, and “mental disability” means one or more mental disorders, as defined in the most recent edition of the American Psychiatric Association’s “Diagnostic and Statistical Manual of Mental Disorders”, or a record of or regarding a person as having one or more such disorders. For the purposes of this section, “contract” does not include a contract where each contractor is (1) a political subdivision of the state, including, but not limited to, a municipality, unless the contract is a municipal public works contract or quasi-public agency project contract, (2) any other state, as defined in section 1-267, (3) the federal government, (4) a foreign government, or (5) an agency of a subdivision, state or government described in subdivision (1), (2), (3) or (4) of this subsection.
- (e) For the purposes of this section, “minority business enterprise” means any small contractor or supplier of materials fifty-one per cent or more of the capital stock, if any, or assets of which is owned by a person or persons: (1) Who are active in the daily affairs of the enterprise, (2) who have the power to direct the management and policies of the enterprise, and (3) who are members of a minority, as such term is defined in subsection (a) of section 32-9n; and “good faith” means that degree of diligence which a reasonable person would exercise in the performance of legal duties and obligations. “Good faith efforts” shall include, but not be limited to, those reasonable initial efforts necessary to comply with statutory or regulatory requirements and additional or substituted efforts when it is determined that such initial efforts will not be sufficient to comply with such requirements.
- (f) Determination of the contractor’s good faith efforts shall include, but shall not be limited to, the following factors: The contractor’s employment and subcontracting policies, patterns and practices; affirmative advertising, recruitment and training; technical assistance activities and such other reasonable activities or efforts as the Commission on Human Rights and

Opportunities may prescribe that are designed to ensure the participation of minority business enterprises in public works projects.

- (g) The contractor shall develop and maintain adequate documentation, in a manner prescribed by the Commission on Human Rights and Opportunities, of its good faith efforts.
- (h) The contractor shall include the provisions of subsections (a) and (b) of this section in every subcontract or purchase order entered into in order to fulfill any obligation of a contract with the state, and in every subcontract entered into in order to fulfill any obligation of a municipal public works contract or contract for a quasi-public agency project, and such provisions shall be binding on a subcontractor, vendor or manufacturer, unless exempted by regulations or orders of the Commission on Human Rights and Opportunities. The contractor shall take such action with respect to any such subcontract or purchase order as the commission may direct as a means of enforcing such provisions, including sanctions for noncompliance in accordance with section 46a-56; provided, if such contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the commission regarding a state contract, the contractor may request the state of Connecticut to enter into any such litigation or negotiation prior thereto to protect the interests of the state and the state may so enter.

Contractor's Exempt Purchase Certificate

General Purpose: Contractors for the repair, alteration, improvement, remodeling, or construction of real property use this certificate to purchase materials and supplies to be installed or placed in a project being performed under contract with an exempt entity. The materials and supplies, including tangible personal property that remains tangible personal property after its installation or placement, must remain in the project after its completion. If the tangible personal property is not used in the manner described above, a contractor who claimed an exemption owes use tax on the total price of the tangible personal property.

Wherever the term contractor is used in this certificate, it includes subcontractors of the contractor performing a contract with an exempt entity.

Exempt entity means any person entitled to make purchases of tangible personal property exempt from sales and use taxes under the statutory authority listed in the instructions.

Name of exempt entity	Address	CT Tax Registration Number (If none, explain.)	Federal Employer ID Number
Address of project			
Type of exempt entity (See instructions.)			
<input type="checkbox"/> Connecticut state government: Enter the exemption number. _____		<input type="checkbox"/> Connecticut municipality	
<input type="checkbox"/> Charitable or religious organization: Enter the exemption number if any. _____		<input type="checkbox"/> Federal government	
<input type="checkbox"/> Other (Explain.) _____			
Name of purchaser	Address	CT Tax Registration Number (If none, explain.)	Federal Employer ID Number
Name of seller	Address	CT Tax Registration Number (If none, explain.)	Federal Employer ID Number
Provide a written description of each item purchased. Attach additional sheets if necessary.			
Check one box: <input type="checkbox"/> Blanket certificate <input type="checkbox"/> Certificate for one purchase only			

Declaration by Purchaser: The item(s) described above are tangible personal property to be installed or placed in a project being performed under contract with the exempt entity identified above and will remain in the project after its completion. I declare that the purchaser named above is a contractor under contract with the exempt entity or a subcontractor of the contractor. I acknowledge that the purchaser will be liable for Connecticut use tax, plus applicable penalty and interest as of the date of purchase, on the total purchase price of the property if any of the requirements for the exemption are not present or are not met.

I declare under penalty of law that I have examined this document (including any accompanying schedules and statements) and, to the best of my knowledge and belief, it is true, complete, and correct. I understand the penalty for willfully delivering a false return or document to the Department of Revenue Services (DRS) is a fine of not more than \$5,000 or imprisonment for not more than five years, or both.

Name of purchaser

By: _____

Authorized signature

Title

Date

Statutory and Regulatory Authority

- Conn. Agencies Regs. §12-426-18;
- Conn. Gen. Stat. §12-412(1) and (2), the United States, the State of Connecticut, or any political subdivisions or agencies of the State of Connecticut; for example state or municipal schools, universities, police, municipal fire departments, and state or municipal libraries. Only Connecticut state agencies have been issued an exemption number that can be entered on this form;
- Conn. Gen. Stat. §12-412(5), nonprofit charitable hospitals, nonprofit nursing homes, nonprofit rest homes and nonprofit residential care homes; and an acute care, for-profit hospital, in operation as of May 12, 2004;
- Conn. Gen. Stat. §12-412(8), Internal Revenue Code §501(c)(3) or (13) organizations exempt from federal income tax. Only charitable or religious organizations that applied to the Department of Revenue Services (DRS) prior to 7/1/95 were issued a Connecticut exemption permit number that can be entered on this form. Other charitable or religious organizations have not been issued a permit number and will leave that space blank;
- Conn. Gen. Stat. § 12-412(84), for purchases with regard to the Connecticut Technology Park;
- Conn. Gen. Stat. § 12-412(90), water companies;
- Conn. Gen. Stat. § 12-412(92), the Connecticut Resources Recovery Authority;
- Conn. Gen. Stat. § 12-412(93), tourism districts;
- Conn. Gen. Stat. § 12-412(95), solid waste-to-energy facilities;
- Conn. Gen. Stat. §7-273mm, municipal or regional resource recovery authorities; and
- Conn. Gen. Stat. § 16-344, the Metropolitan Transportation Authority or subsidiary in connection with the New Haven commuter railroad service.

Instructions for the Purchaser: Use this certificate for purchases of tangible personal property to be installed or placed in a project being performed under a contract with an exempt entity that will remain in the project after its completion. To qualify for the exemption from sales and use taxes, you must present this certificate to the retailer at the time of the purchase of the qualifying tangible personal property. For at least six years from the date it is issued, keep a copy of this certificate and records that substantiate the information entered on this certificate including records to support the contractor's use of this certificate and to show the disposition of all materials or supplies purchased.

If you are unable to designate the exact amount of materials or supplies to be installed or placed in a project being performed under contract with an exempt entity, you must estimate the amount of the purchases. You will be held strictly accountable for any use tax due the state on the purchases in the event of any use other than the permanent installation or placement of the purchases in the exempt project identified in this certificate.

Contractors are the consumers of all the tools, supplies, and equipment used in fulfilling a construction contract that are not installed or placed in the exempt job even if they are used up during the job.

Instructions for the Seller: Acceptance of this certificate, when properly completed, relieves the seller from the burden of proving that tangible personal property is not subject to sales and use taxes when the tangible personal property will be installed or placed in a project being performed under a contract with an exempt entity and will remain in the project after its completion. The certificate is valid only if taken in good faith from a contractor under contract with an exempt entity. The good faith of the seller will be questioned if the seller knows of, or should know of, facts that suggest the contractor does not intend to install or place the property in a project being performed under contract with an exempt entity.

Keep this certificate and bills or invoices to the purchaser for at least six years from the date of purchase. The bills, invoices, or records covering the purchase made under this certificate must be marked to indicate an exempt purchase was made. The words "Exempt under CERT-141" satisfy the requirement.

This certificate may be used for individual purchases, in which case the box marked "Certificate for One Purchase Only" must be checked. This certificate may also be used for a continuing line of exempt purchases for the project identified in this certificate, in which case the box marked "Blanket Certificate" must be checked. A blanket certificate remains in effect for three years unless the purchaser revokes it in writing before the period expires.

For More Information: Call Taxpayer Services at 1-800-382-9463 (Connecticut calls outside the Greater Hartford calling area only) or 860-297-5962 (from anywhere). **TTY, TDD, and Text Telephone users** only may transmit inquiries anytime by calling 860-297-4911. Visit the DRS website at www.ct.gov/DRS to preview and download forms and publications.

EXECUTIVE ORDER NO. THREE

STATE OF CONNECTICUT
BY HIS EXCELLENCY
THOMAS J. MESKILL
GOVERNOR
EXECUTIVE ORDER NO. THREE

WHEREAS, sections 4-61d (b) and 4-11a of the 1969 supplement to the general statutes require nondiscrimination clauses in state contracts and subcontracts for construction on public buildings, other public works and goods and services and

WHEREAS, section 4-61e (c) of the 1969 supplement to the general statutes requires the labor department to encourage and enforce compliance with this policy by both employers and labor unions, and to promote equal employment opportunities, and

WHEREAS, the government of this state recognizes the duty and desirability of its leadership in providing equal employment opportunity, by implementing these laws.

NOW, THEREFORE, I, THOMAS J. MESKILL, Governor of the State of Connecticut, acting by virtue of the authority vested in me under section twelve of article fourth of the constitution of the state, as supplemented by section 3-1 of the general statutes, do hereby ORDER and DIRECT, as follows, by this Executive Order:

I

The labor commissioner shall be responsible for the administration of this Order and shall adopt such regulations as he deems necessary and appropriate to achieve the purposes of this Order. Upon the promulgation of this Order, the commissioner of finance and control shall issue a directive forthwith to all state agencies, that henceforth all state contracts and subcontracts for construction on public buildings, other public works and goods and services shall contain a provision rendering such contract or subcontract subject to this Order, and that such contract or subcontract may be canceled, terminated or suspended by the labor commissioner for violation of or noncompliance with this Order or state and federal laws concerning nondiscrimination, notwithstanding that the labor commissioner is not a party to such contract or subcontract.

II

Each contractor having a contracting containing the provisions prescribed in section 4-11a of the 1969 supplement to the general statutes, shall file and shall cause each of his subcontractors to file, compliance reports with the contracting agency or the labor commissioner, as may be directed. Such reports shall be filed within such times and shall contain such information as to employment policies and statistics of the contractor and each subcontractor, and shall be in such form as the labor commissioner may prescribe. Bidders or prospective contractors or subcontractors may be required to state whether they have participated in any previous contract subject to the provisions of this Order of any preceding similar Order, and in that event to submit on behalf of themselves and their proposed subcontractors compliance reports prior to or as an initial part of their bid or negotiation of a contract.

III

Whenever the contractor or subcontractor has a collective bargaining agreement or contract or understanding with a labor organization or employment agency as defined in section 31-122 of the general statutes, the compliance report shall identify the said organization or agency and the contracting agency or the labor commissioner may require a compliance report to be filed with the contracting agency or the labor commissioner, as may be directed, by such organization or agency, signed by an authorized officer or agent of such organization or agency, with supporting information, to the effect that the signer's practices and policies including but not limited to matters concerning personnel, training, apprenticeship, membership, grievance and representation, and upgrading, do not discriminate on grounds of race, color, religious creed, age, sex or national origin, or ancestry of any individual, and that the signer will either affirmatively cooperate in the implementation of the policy and provisions of this Order, or that it consents and agrees that recruitment, employment and the terms and conditions of employment under the proposed contract shall be in accordance with the purposes and provisions of the Order.

IV

The labor commissioner may by regulation exempt certain classes of contracts, subcontracts or purchase order from the implementation of this Order, for standard commercial supplies or raw materials, for less than specified amounts of money or numbers of workers or for subcontractors below a specified tier. The labor commissioner may also provide by regulation for the exemption of facilities of a contractor which are in all respect a separate and distinct from activities of the contractor related to the performance of the state contract, provided only that such exemption will not interfere with or impede the implementation of this Order, and provided further, that in the absence of such an exemption, all facilities shall be covered by the provisions of this Order.

V

Each contracting agency shall be primarily responsible for obtaining compliance with the regulations of the labor commissioner with respect to contracts entered into by such agency or its contractors. All contracting agencies shall comply with the regulations of the labor commissioner in discharging their primary responsibility for securing compliance with the provisions of contracts and otherwise with the terms of this Order and of the regulations of the labor commissioner issued pursuant to this Order. They are directed to cooperate with the labor commissioner and to furnish the labor commissioner such information and assistance as he may require in the performance of his functions under this Order. They are further directed to appoint or designate from among the personnel of each agency, compliance officers, whose duty shall be to seek compliance with the objectives of this Order by conference, conciliation, mediation, or persuasion.

VI

The labor commissioner may investigate the employment practices and procedures of any state contractor or sub-contractor and the practices and policies of any labor organization or employment agency hereinabove described, relating to employment under the state contract, as concerns nondiscrimination by such organization or agency as hereinabove described, or the labor commissioner may initiate such investigation by the appropriate contract agency, to determine whether or not the contractual provisions, hereinabove specified or statutes of the state respecting they have been violated. Such investigation shall be conducted in accordance with the procedures established by the labor commissioner and the investigating agency shall report to the labor commissioner any action taken or recommended.

VII

The labor commissioner shall receive and investigate or cause to be investigated complaints by employees or prospective employees of a state contractor or subcontractor or member or applicants for membership or apprenticeship or training in a labor organization or employment agency hereinabove described, which allege discrimination contrary to the contractual provisions specified hereinabove or state statutes requiring nondiscrimination in employment opportunity. If this investigation is conducted for the labor commissioner by a contracting agency, that agency shall report to the labor commissioner what action has been taken or is recommended with regard to such complaints.

VIII

The labor commissioner shall use his best efforts directly and through contracting agencies, or other interested federal, state and local agencies, contractors and all other available instrumentalities, including the commission on human rights and opportunities, the executive committee on human rights and opportunities, and the apprenticeship council under its mandate to provide advice and counsel to the labor commissioner in providing equal employment opportunities to all apprentices and provide training, employment and upgrading opportunities for disadvantaged workers, in accordance with section 31-51 (d) of the 1969 supplement to the general statutes, to cause any labor organization or any employment agency whose members are engaged in work under government contracts or referring workers or providing or supervising apprentice-ship or training for or in the course of work under a state contract or subcontract to cooperate in the implementation of the purposes of this Order. The labor commissioner shall in appropriate cases notify the commission on human rights and opportunities or other appropriate state or federal agencies whenever it has reason to believe that the practices of any such organization or agency violate equal employment opportunity requirements or state or federal law.

IX

The labor commissioner or any agency officer or employee in the executive branch designated by regulation of the labor commissioner may hold such hearings, public or private, as the labor commissioner may deem advisable for compliance, enforcement or educational purposes under this Order.

X

(a) The labor commissioner may hold or cause to be held hearings, prior to imposing ordering or recommending the imposition or penalties and sanctions under this Order. No order for disbarment or any contractor from further state contracts shall be made without affording the contractor an opportunity for a hearing. In accordance with such regulations as the labor commissioner may adopt, the commissioner or the appropriate contracting agency may

- (1) Publish or cause to be published the names of contractors or labor organizations or employment agencies as hereinabove described which it has concluded have complied or failed to comply with the provisions of this Order or the regulations of the labor commissioner in implementing this Order.
- (2) Recommend to the commission on human rights and opportunities that in cases in which there is substantial or material violation or threat thereof of the contractual provision or related state statutes concerned herein, appropriate proceedings be brought to enforce them, including proceedings by the commission on its own motion under chapter 563 of the general statutes and the enjoining, within the limitations or applicable law, of organizations, individuals or groups who prevent directly or indirectly or seek to prevent directly or indirectly compliance with the provisions of this Order.
- (3) Recommend that criminal proceedings be brought under chapter 939 of the general statutes.
- (4) Cancel, terminate, suspend or cause to be canceled, terminated, or suspended in accordance with law any contract or any portion or portions thereof for failure of the contractor or subcontractor to comply with the nondiscrimination provisions of the contract. Contracts may be canceled, terminated, suspended absolutely or their continuance conditioned upon a pro-gram for future compliance approved by the contracting agency.
- (5) Provide that any contracting agency shall refrain from entering into any further contract or extensions or modifications of existing contracts with any contractor until he has satisfied the labor commissioner that he has established and will carry out personnel and employment policies compliant with this Order.
- (6) Under regulations prescribed by the labor commissioner each contracting agency shall make reasonable efforts within a reasonable period of time to secure compliance with the contract provisions of this Order by methods of convenience, conciliation, mediation or persuasion, before other proceedings shall be instituted under this Order or before a state contract shall be can-celled or terminated in whole or in part for failure of the contractor or subcontractor to comply with the contract provisions of state statute and this Order.

(b) Any contracting agency taking any action authorized by this Order, whether on its own motion or as directed by the labor commissioner or pursuant to his regulations shall promptly notify him of such action. Whenever the labor commissioner makes a determination under this order, he shall promptly notify the appropriate contracting agency and other interested federal, state and local agencies of the action recommended. The state and local agency or agencies shall take such action and shall report the results thereof to the labor commissioner within such time as he shall specify.

XI

If the labor commissioner shall so direct, contracting agencies shall not enter into contracts with any bidder or prospective contractor unless he has satisfactorily complied with the provisions of this Order, or submits a program for compliance acceptable to the labor commissioner, or if the labor commissioner so authorizes, to the contracting agency.

XII

Whenever a contracting agency cancels or terminates a contract, or a contractor has been disbarred from further government contracts because of noncompliance with the contract provisions with regard to nondiscrimination, the labor commissioner or the contracting agency shall rescind such disbarment, upon the satisfaction of the labor commissioner that the contractor has purged himself of such noncompliance and will thenceforth carry out personnel and employment policies of non-discrimination in compliance with the provision of this Order.

XIII

The labor commissioner may delegate to any officer, agency or employee in the executive branch any function or duty of the labor commissioner under this Order except authority to promulgate regulations of a general nature.

XIV

This Executive Order supplements the Executive Order issued on September 28, 1967. All regulations, orders, instructions, designations and other directives issued heretofore in these premises, including these issued by the heads of various departments or agencies under or pursuant to prior order or statute, shall remain in full force and effect, unless and until revoked or superseded by appropriate authority, to the extent that they are not inconsistent with this Order.

This Order shall become effective thirty days after the date of this Order.

Dated at Hartford, Connecticut, this 16th day of June, 1971.

GOVERNOR

00820.01-B-3

GUIDELINES AND RULES
OF STATE LABOR COMMISSIONER
IMPLEMENTING GOVERNOR'S EXECUTIVE
ORDER NO. THREE

SEC. 1 PERSONS AND FIRMS SUBJECT TO EXECUTIVE ORDER NO. THREE AND GUIDELINES AND RULES.

a. Every contractor, or subcontractor as defined in Sec. 2 hereof, supplier of goods or services, vendor, bidder and prospective contractor or subcontractor, having ten or more employees as defined in Sec. 3 of these guidelines, having or entering into or bidding to enter into any type of contractual relationship with the State of Connecticut or any of its agencies, boards, commissions, departments or officers, and if the consideration, cost, subject matter or value of the goods or services exceeds \$5,000.00, shall be subject to the Governor's Executive Order No. Three and these Guidelines and Rules.

b. A copy of the Governor's Executive Order No. Three and of these Guidelines and Rules shall be available to each said contractor, subcontractor, supplier, vendor, bidder and prospective contractor and subcontractor, and the said Executive Order No. Three and these Guidelines and Rules shall be incorporate by reference and made a part of the contract, purchase order, agreement or document concerned. A copy of the Executive Order and of these Guidelines and Rules shall be furnished to a contracting party or bidder on request.

c. All persons, partnerships, associations, firms, corporations and other entities having less than ten employees as defined in Sec. 3 at the time of the bid and execution of the contract and continuing through the performance of the contract are exempt from the provisions of the said Executive Order and these Guidelines and Rules. All contracts, subcontracts, purchase orders and agreements wherein the consideration ins \$5,000.00 or less shall be exempt from Executive Order No. Three and from these Guidelines and Rules.

SEC. 2 SUBCONTRACTORS

As used herein, subcontractors are persons, partnerships, associations, firms or corporations or other entities having contractual relationship with a contractor who in turn has a contract with the State of Connecticut or any of its agencies, board, commissions or departments. Subcontractors below this tier are exempt from the Executive Order and from these Guidelines and Rules.

SEC. 3 EMPLOYEES

As used herein, employees are persons working full or part-time irrespective of personnel classification whose wages, salaries, or earnings are subject to the Federal Insurance Contribution Act and/or to Federal Withholding Tax as a matter of law (whether in fact or not any actual withholding occurs in a given case), in an employee-employer relationship at the time of bid, contract execution, or offer or acceptance, and/or during any time thereafter during the existence of the performance period of the contract to the conclusion thereof.

SEC. 4 REPORTS

a. Prior to the execution of the contract or prior to acceptance of a bid, as the case may be, the contractor, subcontractor, bidder or vendor shall file a report with the State Labor Commissioner, which report shall be complete and contain all of the information therein prescribed. The report shall be on Form E.O.3-1, a facsimile of which is attached hereto and made a part hereof, or in lieu thereof the contractor, subcontractor, bidder or vendor shall submit a detailed report containing all of the information required in Form E.O. 3-1.

b. The Labor Commissioner may require the filing of additional reports prior to final payment or prior to any renewal or extension of the contract and during the duration of the contract at such times as the Commissioner may, in his discretion, from time to time deem necessary. The Labor Commissioner may require the filing of additional information or reports, and the contractor, subcontractor, bidder or vendor shall furnish said information or report within the times prescribed by the Labor Commissioner.

c. The Labor Commissioner may, at his discretion, also require timely statistical reports on the number of minority employees employed or to be employed in the performance of the contract, and the Labor Commissioner may de-fine such minority groups or persons.

d. Reports filed pursuant to these Guidelines and Rules in Implementation of Executive Order No. Three are not public records subject to public inspection, but may be inspected only by federal and state officials having jurisdiction and authority to investigate matters of this type. All federal and state agencies empowered by law to investigate matters relating to Executive order No. Three shall have access to these reports for inspection or copying during regular business hours.

e. Any person who willfully, wantonly or through negligence destroys or permits to be destroyed, alters or allows to be altered after filing any reports submitted in compliance herewith shall be subject to penalties as pre-scribed by law.

SEC. 5. MANDATORY CLAUSES IN DOCUMENTS

a. All contracts shall contain the following provisions verbatim:

This contract is subject in the provisions of Executive Order No. Three of Governor Thomas J. Meskill promulgated June 16, 1971 and, as such, this contract may be canceled, terminated or suspended by the state labor commissioner for violation of or noncompliance with said Executive Order No. Three, or any state or federal law concerning nondiscrimination, notwithstanding that the labor commissioner is not a party to this contract. The parties to this contract, as part of the consideration hereof, agree that said Executive Order No. Three is incorporated herein by reference and made a part hereof. The parties agree to abide by said Executive Order and agree that the state labor commissioner shall have continuing jurisdiction in respect to contract performance in regard to nondiscrimination, until the contract is completed or terminated prior to completion.

The (contractor), (subcontractor), (bidder), (vendor) agrees, as part consideration hereof, that his (order) (contract) is subject to the Guidelines and Rules issued by the state labor commissioner to implement Executive Order No. Three, and that he will not discriminate in his employment practices or policies, will file all reports as required, and will fully cooperate with the State of Connecticut and the state labor commissioner.

These provisions are in addition to and not in lieu of other clauses required by law.*

*N.B. The above paragraphs contain requirements additional to those set forth in July 16, 1971 directive to state agencies.

b. Every purchase order or like form submitted by a vendor or bidder, as applicable, shall contain the following clause verbatim:

Vendor agrees, as part of the consideration hereof, that this order is subject to the provisions of Executive Order No. Three and the Guidelines and Rules issued by the Labor Commissioner implementing said Order as to nondiscrimination, and vendor agrees to

comply therewith.

c. Where preprinted contract forms have been prescribed by federal authority and the rules of the federal agency prohibit the alteration thereof, the compliance officer of the State agency concerned shall submit to the Labor Commissioner a suggested short form or addendum acceptable to the federal agency, and such cases, after approval by the Labor Commissioner, said clause may be substituted.

SEC. 6. COOPERATION OF STATE AGENCIES, BOARDS AND COMMISSIONS

Every agency, board, commission and departments of the State of Connecticut shall cooperate with the Labor Commissioner in the implantation of Executive Order No. Three and shall furnish such information and assistance as the Labor Commissioner may from time to time request.

SEC. 7. INVESTIGATIONS, COMPLAINTS

The Labor Commissioner may initiate an investigation upon receipt of a complaint alleging discrimination. The Labor Commissioner may request that an investigation be conducted by the State agency which is the party to the contract in question. Investigations shall be conducted in accordance with acceptable legal standards, safeguarding the rights of all parties involved, and obtaining all of the relevant facts necessary for a complete determination of the issues. If the Labor Commissioner is not satisfied with the investigation or any part thereof he may order it to continue or to proceed further.

SEC. 8. HEARINGS

The Labor Commissioner or officers designed by the heads of the State agencies, boards and commissions may conduct hearings on complaints filed. Hearings shall be held only after a report of the complaint has been filed with the Labor Commissioner and after a hearing on the complaint has been authorized or directed by the Labor Commissioner. Hearings shall be in accordance with the accepted principles of administrative law. All parties shall be afforded the opportunity to a full, fair, impartial and complete hearing, the opportunity to examine and cross examine witnesses and to be present at all sessions of the hearing. If any party is vulnerable to a charge of a violation of the law, he shall be afforded the opportunity to procure counsel who say be present at the hearing.

SEC. 9. EQUAL EMPLOYMENT OPPORTUNITIES

All State contracting agencies, employers, and labor unions shall use their best efforts to provide equal employment opportunities to all apprentices and to provide training, employment and upgrading opportunities for disadvantaged workers in accordance with section 31-51 (d) of the General Statutes.

SEC. 10. DUTIES OF CONTRACTING AGENCIES.

All State contracting agencies shall be responsible for compliance with said Executive Order and with all state and federal laws relating to equal employment opportunities. All contracting agencies conducting investigations for the Labor Commissioner pursuant to Executive Order No. Three and these Guidelines and Rules shall report to the Labor Commissioner the action taken or recommended with regard to each complaint filed. Each officer of the executive department, every commissioner, and each executive head of each State agency, board and commission in the executive branch of the State government is expected to assume the responsibility of seeing to complete compliance with the Governor's Executive Order No. Three and shall forthwith take steps to assure and guarantee that there shall be no discrimination within their departments, agencies, boards or commissions in the performance of any state contract or subcontract on the basis of race, creed, color, sex, age, national origin or national ancestry, or in any way in violation of any state or federal law relating thereto.

BY VIRTUE OF THE AUTHORITY VESTED IN ME PURSUANT TO EXECUTIVE ORDER NO. THREE EFFECTIVE JULY 16, 1971, AND THE GENERAL STATUTES OF CONNECTICUT.

Date in Wethersfield, Connecticut this 19th day of Nov. , 1971,

Jack Fusari
Labor Commissione

EXECUTIVE ORDER NO. SEVENTEEN

STATE OF CONNECTICUT
THOMAS J. MESKILL
GOVERNOR
EXECUTIVE ORDER NO. SEVENTEEN

WHEREAS, Section 31-247 of the General statutes of Connecticut as amended requires the maintaining of the established free services of the Connecticut State Employment Service to both employers and prospective employees and

WHEREAS, Section 31-5 of the General Statutes of Connecticut requires that no compensation or fee shall be charged or received directly or indirectly for the services of the Connecticut State Employment Service and

WHEREAS, large numbers of our citizens who have served in the Armed Forces of our nation are returned to civilian life in our state and seeking employment in civilian occupations and

WHEREAS, we owe a duty as well as gratitude to these returning veterans including the duty to find suitable employment for them and

WHEREAS, many of our handicapped citizens are fully capable of employment and are entitled to be placed in suitable employment and

WHEREAS, many of the citizens of our state who are unemployed are unaware of the job openings and employment opportunities which do in fact exist in our state and

WHEREAS, notwithstanding the free services of the Connecticut State Employment Service, many of our Connecticut employers do not use its free services or do not avail themselves fully of all the services offered.

NOW, THEREFORE, I, Thomas J. Meskill, Governor of the State of Connecticut, acting by virtue of the authority vested in me under the fourth article of the Constitution of the State and in accordance with Section 3-1 of the General Statutes, do hereby ORDER and DIRECT, as follows, by this Executive Order:

I

The Labor Commissioner shall be responsible for the administration of this Order and shall do all acts necessary and appropriate to achieve its purpose. Upon the promulgation of this Order, the Commissioner of Finance and Control shall issue a directive forthwith to all state agencies that henceforth all state contracts and subcontracts for construction on public buildings, other public works and goods and services shall contain a provision rendering such contract or subcontract subject to this Order, and that such contract or subcontract may be canceled, terminated or suspended by the Labor Commissioner for violation of or noncompliance with this Order, notwithstanding that the Labor Commissioner is not a party to such contract or subcontract.

II

Every contractor and subcontractor having a contract with the state or any of its agencies, boards, commissions, or departments, every individual partnership, corporation, or business entity having business with the state or who or which seeks to do business in the state, and every bidder or prospective bidder who submits a bid or replies to an invitation to bid on any state contract shall list all employment openings with the office of the Connecticut State Employment Service in the area where the work is in performed or where the services are to be rendered.

III

All state contracts shall contain a clause which shall be a condition of the contract that the contractor and any subcontractor holding a contract directly under the contractor shall list all employment openings with the Connecticut State Employment Service. The Labor Commissioner may allow exceptions to listings of employment openings which the contractor proposes to fill from within its organization from employees on the rolls of contractor on the date of publication of the invitation to bid or the date on which the public announcement was published or promulgated advising of the program concerned.

IV

Each contracting agency of the state shall be primarily responsible for obtaining compliance with this Executive Order. Each contracting agency shall appoint or designate from among its personnel one or more persons who shall be responsible for compliance with the objectives of this Order

V

The Labor Commissioner shall be and is hereby empowered to inspect the books, records, payroll and personnel data of each individual or business entity subject to this Executive Order and may hold hearings or conference, formal or informal, in pursuance of the duties and responsibilities hereunto delegated to the Labor Commissioner.

VI

The Labor Commissioner or any agency officer or employee in the executive branch designated by regulation of the Labor Commissioner may hold such hearings, public or private, as the Labor Commissioner may deem advisable for compliance, enforcement or educational purposes under this Order.

VII

(a) The Labor Commissioner may hold or cause to be held hearings, prior to imposing, ordering, or recommending the imposition of penalties and sanctions under this Order. In accordance herewith, the Commissioner or the appropriate contracting agency may suspend, cancel, terminate, or cause to be suspended, canceled, or terminated in accordance with law any contract or any portion or portions thereof for failure of the contractor or subcontractor to comply with the listing provisions of the contract. Contracts may be canceled, terminated, suspended absolutely or their continuance conditioned upon a program for future compliance approved by the contracting agency.

(b) Any contracting agency taking any action authorized by this Order, whether on its own motion or as directed by the Labor Commissioner, shall promptly notify him of such action. Whenever the Labor Commissioner makes a determination under this Order, he shall promptly notify the appropriate contracting agency of the action recommended. The agency shall report the results to the Labor Commissioner promptly.

VIII

If the Labor Commissioner shall so direct, contracting agencies shall not enter into contracts with any bidder or prospective contractor unless he has satisfactorily complied with the provisions of this Order.

This Order shall become effective sixty days after the date of this Order.

Dated at Hartford, Connecticut, this 15th day of February, 1973.

Governor

EXECUTIVE ORDER NO. SIXTEEN

STATE OF CONNECTICUT
BY HIS EXCELLENCY
JOHN G. ROWLAND
GOVERNOR
EXECUTIVE ORDER NO. SIXTEEN

WHEREAS, the State of Connecticut recognizes that workplace violence is a growing problem that must be addressed; and

WHEREAS, the State is committed to providing its employees a reasonably safe and healthy working environment, free from intimidation, harassment, threats, and/or violent acts; and

WHEREAS, violence or the threat of violence by or against any employee of the State of Connecticut or member of the public in the workplace is unacceptable and will subject the perpetrator to serious disciplinary action up to and including discharge and criminal penalties.

NOW, THEREFORE, I, John G. Rowland, Governor of the State of Connecticut, acting by virtue of the authority vested in me by the Constitution and by the statutes of this state, do hereby ORDER and DIRECT:

That all state agency personnel, contractors, subcontractors, and vendors comply with the following Violence in the Workplace Prevention Policy:

The State of Connecticut adopts a statewide zero tolerance policy for workplace violence.

Therefore, except as may be required as a condition of employment ³/₄

No employee shall bring into any state worksite any weapon or dangerous instrument as defined herein.

No employee shall use, attempt to use, or threaten to use any such weapon or dangerous instrument in a state worksite.

No employee shall cause or threaten to cause death or physical injury to any individual in a state worksite.

Weapon means any firearm, including a BB gun, whether loaded or unloaded, any knife (excluding a small pen or pocket knife), including a switchblade or other knife having an automatic spring release device, a stiletto, and police baton or nightstick or any martial arts weapon or electronic defense weapon.

Dangerous instrument means any instrument, article, or substance that, under the circumstances, is capable of causing death or serious physical injury.

Violation of the above reasonable work rules shall subject the employee to disciplinary action up to and including discharge.

That each agency must prominently post this policy and that all managers and supervisors must clearly communicate this policy to all state employees.

That all manager and supervisors are expected to enforce this policy fairly and uniformly.

That any employee who feels subjected to or witnesses violent, threatening, harassing, or intimidating behavior in the workplace immediately report the incident or statement to their supervisor, manager, or human resources office.

That any employee who believes that there is a serious threat to their safety or the safety of others that requires immediate attention notifies proper law enforcement authorities and his or her manager or supervisor.

That any manager or supervisor receiving such a report shall immediately contact their human resources office to evaluate, investigate and take appropriate action.

That all parties must cooperate fully when questioned regarding violations of this policy.

That all parties be advised that any weapon or dangerous instrument at the worksite will be confiscated and that there is no reasonable expectation of privacy with respect to such items in the workplace.

That this order applies to all state employees in the executive branch.

That each agency will monitor the effective implementation of this policy.

That this order shall take effect immediately.

Dated in Hartford, Connecticut, this fourth day of August, 1999.

/s/John G. Rowland, Governor

STATE WAGE RATES

DOCUMENT 00820.02

WAGE RATE REQUIREMENTS

00820.02 WAGE RATE REQUIREMENTS. wage rates on this project shall conform to the following:

A. CONNECTICUT REQUIREMENTS. The state of Connecticut requires minimum wage rates to be paid if the value of work done on this Contract exceeds \$400,000 for new construction or exceeds \$ 100,000 for remodeling, refinishing, refurbishing, rehabilitation, alteration or repair of any public works project. These wage rates, if required for this project, are included in Document 00830.

B. CERTIFIED PAYROLL/COMPLIANCE STATEMENT. The Contractor may be required, for work under this Contract, to submit weekly to the Engineer a certified payroll and compliance statement consistent with the requirements of public act 93-392. (Section 31-53 of Connecticut General Statutes, as amended.) A copy of this form, if submittal is required, is included following this page.

C. DELETED

D. RATES TO BE PAID: The minimum wage rates to be paid on this project shall be as shown on either the State of Connecticut Labor Department Wage Rate Schedule. The State of Connecticut Department of Environmental Protection has determined that all construction on this project shall be covered by the heavy construction rates and classifications.

END OF DOCUMENT



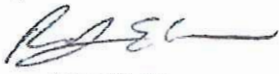
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

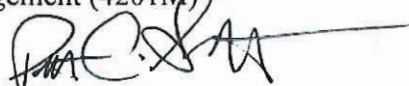
MAR 20 2014

OFFICE OF WATER

MEMORANDUM

SUBJECT: Implementation of American Iron and Steel provisions of P.L. 113-76, Consolidated Appropriations Act, 2014

FROM: For Andrew D. Sawyers, Director 
Office of Wastewater Management (4201M)

Peter C. Grevatt, Director 
Office of Ground Water and Drinking Water (4601M)

TO: Water Management Division Directors
Regions I - X

P.L. 113-76, Consolidated Appropriations Act, 2014 (Act), includes an "American Iron and Steel (AIS)" requirement in section 436 that requires Clean Water State Revolving Loan Fund (CWSRF) and Drinking Water State Revolving Loan Fund (DWSRF) assistance recipients to use iron and steel products that are produced in the United States for projects for the construction, alteration, maintenance, or repair of a public water system or treatment works if the project is funded through an assistance agreement executed beginning January 17, 2014 (enactment of the Act), through the end of Federal Fiscal Year 2014.

Section 436 also sets forth certain circumstances under which EPA may waive the AIS requirement. Furthermore, the Act specifically exempts projects where engineering plans and specifications were approved by a State agency prior to January 17, 2014.

The approach described below explains how EPA will implement the AIS requirement. The first section is in the form of questions and answers that address the types of projects that must comply with the AIS requirement, the types of products covered by the AIS requirement, and compliance. The second section is a step-by-step process for requesting waivers and the circumstances under which waivers may be granted.

Implementation

The Act states:

Sec. 436. (a)(1) None of the funds made available by a State water pollution control revolving fund as authorized by title VI of the Federal Water Pollution Control Act (33 U.S.C. 1381 et seq.) or made available by a drinking water treatment revolving loan fund as authorized by section 1452 of the Safe Drinking Water Act (42 U.S.C. 300j-12) shall be used for a project for the construction, alteration, maintenance, or repair of a public water system or treatment works unless all of the iron and steel products used in the project are produced in the United States.

(2) In this section, the term “iron and steel products” means the following products made primarily of iron or steel: lined or unlined pipes and fittings, manhole covers and other municipal castings, hydrants, tanks, flanges, pipe clamps and restraints, valves, structural steel, reinforced precast concrete, and construction materials.

(b) Subsection (a) shall not apply in any case or category of cases in which the Administrator of the Environmental Protection Agency (in this section referred to as the “Administrator”) finds that—

(1) applying subsection (a) would be inconsistent with the public interest;

(2) iron and steel products are not produced in the United States in sufficient and reasonably available quantities and of a satisfactory quality; or

(3) inclusion of iron and steel products produced in the United States will increase the cost of the overall project by more than 25 percent.

(c) If the Administrator receives a request for a waiver under this section, the Administrator shall make available to the public on an informal basis a copy of the request and information available to the Administrator concerning the request, and shall allow for informal public input on the request for at least 15 days prior to making a finding based on the request. The Administrator shall make the request and accompanying information available by electronic means, including on the official public Internet Web site of the Environmental Protection Agency.

(d) This section shall be applied in a manner consistent with United States obligations under international agreements.

(e) The Administrator may retain up to 0.25 percent of the funds appropriated in this Act for the Clean and Drinking Water State Revolving Funds for carrying out

the provisions described in subsection (a)(1) for management and oversight of the requirements of this section.

(f) This section does not apply with respect to a project if a State agency approves the engineering plans and specifications for the project, in that agency's capacity to approve such plans and specifications prior to a project requesting bids, prior to the date of the enactment of this Act.

The following questions and answers provide guidance for implementing and complying with the AIS requirements:

Project Coverage

1) What classes of projects are covered by the AIS requirement?

All treatment works projects funded by a CWSRF assistance agreement, and all public water system projects funded by a DWSRF assistance agreement, from the date of enactment through the end of Federal Fiscal Year 2014, are covered. The AIS requirements apply to the entirety of the project, no matter when construction begins or ends. Additionally, the AIS requirements apply to all parts of the project, no matter the source of funding.

2) Does the AIS requirement apply to nonpoint source projects or national estuary projects?

No. Congress did not include an AIS requirement for nonpoint source and national estuary projects unless the project can also be classified as a 'treatment works' as defined by section 212 of the Clean Water Act.

3) Are any projects for the construction, alteration, maintenance, or repair of a public water system or treatment works excluded from the AIS requirement?

Any project, whether a treatment works project or a public water system project, for which engineering plans and specifications were approved by the responsible state agency prior to January 17, 2014, is excluded from the AIS requirements.

4) What if the project does not have approved engineering plans and specifications but has signed an assistance agreement with a CWSRF or DWSRF program prior to January 17, 2014?

The AIS requirements do not apply to any project for which an assistance agreement was signed prior to January 17, 2014.

- 5) What if the project does not have approved engineering plans and specifications, but bids were advertised prior to January 17, 2014 and an assistance agreement was signed after January 17, 2014?**

If the project does not require approved engineering plans and specifications, the bid advertisement date will count in lieu of the approval date for purposes of the exemption in section 436(f).

- 6) What if the assistance agreement that was signed prior to January 17, 2014, only funded a part of the overall project, where the remainder of the project will be funded later with another SRF loan?**

If the original assistance agreement funded any construction of the project, the date of the original assistance agreement counts for purposes of the exemption. If the original assistance agreement was only for planning and design, the date of that assistance agreement will count for purposes of the exemption only if there is a written commitment or expectation on the part of the assistance recipient to fund the remainder of the project with SRF funds.

- 7) What if the assistance agreement that was signed prior to January 17, 2014, funded the first phase of a multi-phase project, where the remaining phases will be funded by SRF assistance in the future?**

In such a case, the phases of the project will be considered a single project if all construction necessary to complete the building or work, regardless of the number of contracts or assistance agreements involved, are closely related in purpose, time and place. However, there are many situations in which major construction activities are clearly undertaken in phases that are distinct in purpose, time, or place. In the case of distinct phases, projects with engineering plans and specifications approval or assistance agreements signed prior to January 17, 2014 would be excluded from AIS requirements while those approved/signed on January 17, 2014, or later would be covered by the AIS requirements.

- 8) What if a project has split funding from a non-SRF source?**

Many States intend to fund projects with "split" funding, from the SRF program and from State or other programs. Based on the Act language in section 436, which requires that American iron and steel products be used in any project for the construction, alteration, maintenance, or repair of a public water system or treatment works receiving SRF funding between and including January 17, 2014 and September 30, 2014, any project that is funded in whole or in part with such funds must comply with the AIS requirement. A "project" consists of all construction necessary to complete the building or work regardless of the number of contracts or assistance agreements involved so long as all contracts and assistance agreements awarded are closely related in purpose, time and place. This precludes the intentional splitting of SRF projects into separate and smaller contracts or assistance agreements to avoid AIS coverage on some portion of a larger

project, particularly where the activities are integrally and proximately related to the whole. However, there are many situations in which major construction activities are clearly undertaken in separate phases that are distinct in purpose, time, or place, in which case, separate contracts or assistance agreement for SRF and State or other funding would carry separate requirements.

9) What about refinancing?

If a project began construction, financed from a non-SRF source, prior to January 17, 2014, but is refinanced through an SRF assistance agreement executed on or after January 17, 2014 and prior to October 1, 2014, AIS requirements will apply to all construction that occurs on or after January 17, 2014, through completion of construction, unless, as is likely, engineering plans and specifications were approved by a responsible state agency prior to January 17, 2014. There is no retroactive application of the AIS requirements where a refinancing occurs for a project that has completed construction prior to January 17, 2014.

10) Do the AIS requirements apply to any other EPA programs, besides the SRF program, such as the Tribal Set-aside grants or grants to the Territories and DC?

No, the AIS requirement only applies to funds made available by a State water pollution control revolving fund as authorized by title VI of the Federal Water Pollution Control Act (33 U.S.C. 1381 et seq.) or made available by a drinking water treatment revolving loan fund as authorized by section 1452 of the Safe Drinking Water Act (42 U.S.C. 300j-12)

Covered Iron and Steel Products

11) What is an iron or steel product?

For purposes of the CWSRF and DWSRF projects that must comply with the AIS requirement, an iron or steel product is one of the following made primarily of iron or steel that is permanently incorporated into the public water system or treatment works:

- Lined or unlined pipes or fittings;
- Manhole Covers;
- Municipal Castings (defined in more detail below);
- Hydrants;
- Tanks;
- Flanges;
- Pipe clamps and restraints;
- Valves;
- Structural steel (defined in more detail below);
- Reinforced precast concrete; and
- Construction materials (defined in more detail below).

12) What does the term 'primarily iron or steel' mean?

'Primarily iron or steel' places constraints on the list of products above. For one of the listed products to be considered subject to the AIS requirements, it must be made of greater than 50% iron or steel, measured by cost. The cost should be based on the material costs.

13) Can you provide an example of how to perform a cost determination?

For example, the iron portion of a fire hydrant would likely be the bonnet, body and shoe, and the cost then would include the pouring and casting to create those components. The other material costs would include non-iron and steel internal workings of the fire hydrant (i.e., stem, coupling, valve, seals, etc). However, the assembly of the internal workings into the hydrant body would not be included in this cost calculation. If one of the listed products is not made primarily of iron or steel, United States (US) provenance is not required. An exception to this definition is reinforced precast concrete, which is addressed in a later question.

14) If a product is composed of more than 50% iron or steel, but is not listed in the above list of items, must the item be produced in the US? Alternatively, must the iron or steel in such a product be produced in the US?

The answer to both question is no. Only items on the above list must be produced in the US. Additionally, the iron or steel in a non-listed item can be sourced from outside the US.

15) What is the definition of steel?

Steel means an alloy that includes at least 50 percent iron, between .02 and 2 percent carbon, and may include other elements. Metallic elements such as chromium, nickel, molybdenum, manganese, and silicon may be added during the melting of steel for the purpose of enhancing properties such as corrosion resistance, hardness, or strength. The definition of steel covers carbon steel, alloy steel, stainless steel, tool steel and other specialty steels.

16) What does 'produced in the United States' mean?

Production in the United States of the iron or steel products used in the project requires that all manufacturing processes, including application of coatings, must take place in the United States, with the exception of metallurgical processes involving refinement of steel additives. All manufacturing processes includes processes such as melting, refining, forming, rolling, drawing, finishing, fabricating and coating. Further, if a domestic iron and steel product is taken out of the US for any part of the manufacturing process, it becomes foreign source material. However, raw materials such as iron ore, limestone and iron and steel scrap are not covered by the AIS requirement, and the

material(s), if any, being applied as a coating are similarly not covered. Non-iron or steel components of an iron and steel product may come from non-US sources. For example, for products such as valves and hydrants, the individual non-iron and steel components do not have to be of domestic origin.

17) Are the raw materials used in the production of iron or steel required to come from US sources?

No. Raw materials, such as iron ore, limestone, scrap iron, and scrap steel, can come from non-US sources.

18) If an above listed item is primarily made of iron or steel, but is only at the construction site temporarily, must such an item be produced in the US?

No. Only the above listed products made primarily of iron or steel, permanently incorporated into the project must be produced in the US. For example trench boxes, scaffolding or equipment, which are removed from the project site upon completion of the project, are not required to be made of U.S. Iron or Steel.

19) What is the definition of 'municipal castings'?

Municipal castings are cast iron or steel infrastructure products that are melted and cast. They typically provide access, protection, or housing for components incorporated into utility owned drinking water, storm water, wastewater, and surface infrastructure. They are typically made of grey or ductile iron, or steel. Examples of municipal castings are:

- Access Hatches;
- Ballast Screen;
- Benches (Iron or Steel);
- Bollards;
- Cast Bases;
- Cast Iron Hinged Hatches, Square and Rectangular;
- Cast Iron Riser Rings;
- Catch Basin Inlet;
- Cleanout/Monument Boxes;
- Construction Covers and Frames;
- Curb and Corner Guards;
- Curb Openings;
- Detectable Warning Plates;
- Downspout Shoes (Boot, Inlet);
- Drainage Grates, Frames and Curb Inlets;
- Inlets;
- Junction Boxes;
- Lampposts;
- Manhole Covers, Rings and Frames, Risers;

Meter Boxes;
Service Boxes;
Steel Hinged Hatches, Square and Rectangular;
Steel Riser Rings;
Trash receptacles;
Tree Grates;
Tree Guards;
Trench Grates; and
Valve Boxes, Covers and Risers.

20) What is 'structural steel'?

Structural steel is rolled flanged shapes, having at least one dimension of their cross-section three inches or greater, which are used in the construction of bridges, buildings, ships, railroad rolling stock, and for numerous other constructional purposes. Such shapes are designated as wide-flange shapes, standard I-beams, channels, angles, tees and zees. Other shapes include H-piles, sheet piling, tie plates, cross ties, and those for other special purposes.

21) What is a 'construction material' for purposes of the AIS requirement?

Construction materials are those articles, materials, or supplies made primarily of iron and steel, that are permanently incorporated into the project, not including mechanical and/or electrical components, equipment and systems. Some of these products may overlap with what is also considered "structural steel". This includes, but is not limited to, the following products: wire rod, bar, angles, concrete reinforcing bar, wire, wire cloth, wire rope and cables, tubing, framing, joists, trusses, fasteners (i.e., nuts and bolts), welding rods, decking, grating, railings, stairs, access ramps, fire escapes, ladders, wall panels, dome structures, roofing, ductwork, surface drains, cable hanging systems, manhole steps, fencing and fence tubing, guardrails, doors, and stationary screens.

22) What is not considered a 'construction material' for purposes of the AIS requirement?

Mechanical and electrical components, equipment and systems are not considered construction materials. Mechanical equipment is typically that which has motorized parts and/or is powered by a motor. Electrical equipment is typically any machine powered by electricity and includes components that are part of the electrical distribution system.

The following examples (including their appurtenances necessary for their intended use and operation) are NOT considered construction materials: pumps, motors, gear reducers, drives (including variable frequency drives (VFDs)), electric/pneumatic/manual accessories used to operate valves (such as electric valve actuators), mixers, gates, motorized screens (such as traveling screens), blowers/aeration equipment, compressors, meters, sensors, controls and switches, supervisory control and

data acquisition (SCADA), membrane bioreactor systems, membrane filtration systems, filters, clarifiers and clarifier mechanisms, rakes, grinders, disinfection systems, presses (including belt presses), conveyors, cranes, HVAC (excluding ductwork), water heaters, heat exchangers, generators, cabinetry and housings (such as electrical boxes/enclosures), lighting fixtures, electrical conduit, emergency life systems, metal office furniture, shelving, laboratory equipment, analytical instrumentation, and dewatering equipment.

23) If the iron or steel is produced in the US, may other steps in the manufacturing process take place outside of the US, such as assembly?

No. Production in the US of the iron or steel used in a listed product requires that all manufacturing processes must take place in the United States, except metallurgical processes involving refinement of steel additives.

24) What processes must occur in the US to be compliant with the AIS requirement for reinforced precast concrete?

While reinforced precast concrete may not be at least 50% iron or steel, in this particular case, the reinforcing bar and wire must be produced in the US and meet the same standards as for any other iron or steel product. Additionally, the casting of the concrete product must take place in the US. The cement and other raw materials used in concrete production are not required to be of domestic origin.

If the reinforced concrete is cast at the construction site, the reinforcing bar and wire are considered to be a construction material and must be produced in the US.

Compliance

25) How should an assistance recipient document compliance with the AIS requirement?

In order to ensure compliance with the AIS requirement, specific AIS contract language must be included in each contract, starting with the assistance agreement, all the way down to the purchase agreements. Sample language for assistance agreements and contracts can be found in Appendix 3 and 4.

EPA recommends the use of a step certification process, similar to one used by the Federal Highway Administration. The step certification process is a method to ensure that producers adhere to the AIS requirement and assistance recipients can verify that products comply with the AIS requirement. The process also establishes accountability and better enables States to take enforcement actions against violators.

Step certification creates a paper trail which documents the location of the manufacturing process involved with the production of steel and iron materials. A step certification is a process under which each handler (supplier, fabricator, manufacturer,

processor, etc) of the iron and steel products certifies that their step in the process was domestically performed. Each time a step in the manufacturing process takes place, the manufacturer delivers its work along with a certification of its origin. A certification can be quite simple. Typically, it includes the name of the manufacturer, the location of the manufacturing facility where the product or process took place (not its headquarters), a description of the product or item being delivered, and a signature by a manufacturer's responsible party. Attached, as Appendix 5, are sample certifications. These certifications should be collected and maintained by assistance recipients.

Alternatively, the final manufacturer that delivers the iron or steel product to the worksite, vendor, or contractor, may provide a certification asserting that all manufacturing processes occurred in the US. While this type of certification may be acceptable, it may not provide the same degree of assurance. Additional documentation may be needed if the certification is lacking important information. Step certification is the best practice.

26) How should a State ensure assistance recipients are complying with the AIS requirement?

In order to ensure compliance with the AIS requirement, States SRF programs must include specific AIS contract language in the assistance agreement. Sample language for assistance agreements can be found in Appendix 3.

States should also, as a best practice, conduct site visits of projects during construction and review documentation demonstrating proof of compliance which the assistance recipient has gathered.

27) What happens if a State or EPA finds a non-compliant iron and/or steel product permanently incorporated in the project?

If a potentially non-compliant product is identified, the State should notify the assistance recipient of the apparent unauthorized use of the non-domestic component, including a proposed corrective action, and should be given the opportunity to reply. If unauthorized use is confirmed, the State can take one or more of the following actions: request a waiver where appropriate; require the removal of the non-domestic item; or withhold payment for all or part of the project. Only EPA can issue waivers to authorize the use of a non-domestic item. EPA may use remedies available to it under the Clean Water Act, the Safe Drinking Water Act, and 40 CFR part 31 grant regulations, in the event of a violation of a grant term and condition.

It is recommended that the State work collaboratively with EPA to determine the appropriate corrective action, especially in cases where the State is the one who identifies the item in noncompliance or there is a disagreement with the assistance recipient.

If fraud, waste, abuse, or any violation of the law is suspected, the Office of Inspector General (OIG) should be contacted immediately. The OIG can be reached at 1-

888-546-8740 or OIG_Hotline@epa.gov. More information can be found at this website: <http://www.epa.gov/oig/hotline.htm>.

28) How do international trade agreements affect the implementation of the AIS requirements?

The AIS provision applies in a manner consistent with United States obligations under international agreements. Typically, these obligations only apply to direct procurement by the entities that are signatories to such agreements. In general, SRF assistance recipients are not signatories to such agreements, so these agreements have no impact on this AIS provision. In the few instances where such an agreement applies to a municipality, that municipality is under the obligation to determine its applicability and requirements and document the actions taken to comply for the State.

Waiver Process

The statute permits EPA to issue waivers for a case or category of cases where EPA finds (1) that applying these requirements would be inconsistent with the public interest; (2) iron and steel products are not produced in the US in sufficient and reasonably available quantities and of a satisfactory quality; or (3) inclusion of iron and steel products produced in the US will increase the cost of the overall project by more than 25 percent.

In order to implement the AIS requirements, EPA has developed an approach to allow for effective and efficient implementation of the waiver process to allow projects to proceed in a timely manner. The framework described below will allow States, on behalf of the assistance recipients, to apply for waivers of the AIS requirement directly to EPA Headquarters. Only waiver requests received from states will be considered. Pursuant to the Act, EPA has the responsibility to make findings as to the issuance of waivers to the AIS requirements.

Definitions

The following terms are critical to the interpretation and implementation of the AIS requirements and apply to the process described in this memorandum:

Reasonably Available Quantity: The quantity of iron or steel products is available or will be available at the time needed and place needed, and in the proper form or specification as specified in the project plans and design.

Satisfactory Quality: The quality of iron or steel products, as specified in the project plans and designs.

Assistance Recipient: A borrower or grantee that receives funding from a State CWSRF or DWSRF program.

Step-By-Step Waiver Process

Application by Assistance Recipient

Each local entity that receives SRF water infrastructure financial assistance is required by section 436 of the Act to use American made iron and steel products in the construction of its project. However, the recipient may request a waiver. Until a waiver is granted by EPA, the AIS requirement stands, except as noted above with respect to municipalities covered by international agreements.

The waiver process begins with the SRF assistance recipient. In order to fulfill the AIS requirement, the assistance recipient must in good faith design the project (where applicable) and solicit bids for construction with American made iron and steel products. It is essential that the assistance recipient include the AIS terms in any request for proposals or solicitations for bids, and in all contracts (see Appendix 3 for sample construction contract language). The assistance recipient may receive a waiver at any point before, during, or after the bid process, if one or more of three conditions is met:

1. Applying the American Iron and Steel requirements of the Act would be inconsistent with the public interest;
2. Iron and steel products are not produced in the United States in sufficient and reasonably available quantities and of a satisfactory quality; or
3. Inclusion of iron and steel products produced in the United States will increase the cost of the overall project by more than 25 percent.

Proper and sufficient documentation must be provided by the assistance recipient. A checklist detailing the types of information required for a waiver to be processed is attached as Appendix 1.

Additionally, it is strongly encouraged that assistance recipients hold pre-bid conferences with potential bidders. A pre-bid conference can help to identify iron and steel products needed to complete the project as described in the plans and specifications that may not be available from domestic sources. It may also identify the need to seek a waiver prior to bid, and can help inform the recipient on compliance options.

In order to apply for a project waiver, the assistance recipient should email the request in the form of a Word document (.doc) to the State SRF program. It is strongly recommended that the State designate a single person for all AIS communications. The State SRF designee will review the application for the waiver and determine whether the necessary information has been included. Once the waiver application is complete, the State designee will forward the application to either of two email addresses. For CWSRF waiver requests, please send the application to: cwsrfwaiver@epa.gov. For DWSRF waiver requests, please send the application to: dwsrfwaiver@epa.gov.

Evaluation by EPA

After receiving an application for waiver of the AIS requirements, EPA Headquarters will publish the request on its website for 15 days and receive informal comment. EPA Headquarters will then use the checklist in Appendix 2 to determine whether the application properly and adequately documents and justifies the statutory basis cited for the waiver – that it is quantitatively and qualitatively sufficient – and to determine whether or not to grant the waiver.

In the event that EPA finds that adequate documentation and justification has been submitted, the Administrator may grant a waiver to the assistance recipient. EPA will notify the State designee that a waiver request has been approved or denied as soon as such a decision has been made. Granting such a waiver is a three-step process:

1. Posting – After receiving an application for a waiver, EPA is required to publish the application and all material submitted with the application on EPA's website for 15 days. During that period, the public will have the opportunity to review the request and provide informal comment to EPA. The website can be found at: http://water.epa.gov/grants_funding/aisrequirement.cfm
2. Evaluation – After receiving an application for waiver of the AIS requirements, EPA Headquarters will use the checklist in Appendix 2 to determine whether the application properly and adequately documents and justifies the statutory basis cited for the waiver – that it is quantitatively and qualitatively sufficient – and to determine whether or not to grant the waiver.
3. Signature of waiver approval by the Administrator or another agency official with delegated authority – As soon as the waiver is signed and dated, EPA will notify the State SRF program, and post the signed waiver on our website. The assistance recipient should keep a copy of the signed waiver in its project files.

Public Interest Waivers

EPA has the authority to issue public interest waivers. Evaluation of a public interest waiver request may be more complicated than that of other waiver requests so they may take more time than other waiver requests for a decision to be made. An example of a public interest waiver that might be issued could be for a community that has standardized on a particular type or manufacturer of a valve because of its performance to meet their specifications. Switching to an alternative valve may require staff to be trained on the new equipment and additional spare parts would need to be purchased and stocked, existing valves may need to be unnecessarily replaced, and portions of the system may need to be redesigned. Therefore, requiring the community to install an alternative valve would be inconsistent with public interest.

EPA also has the authority to issue a public interest waiver that covers categories of products that might apply to all projects.

EPA reserves the right to issue national waivers that may apply to particular classes of assistance recipients, particular classes of projects, or particular categories of iron or steel products. EPA may develop national or (US geographic) regional categorical waivers through the identification of similar circumstances in the detailed justifications presented to EPA in a waiver request or requests. EPA may issue a national waiver based on policy decisions regarding the public's interest or a determination that a particular item is not produced domestically in reasonably available quantities or of a sufficient quality. In such cases, EPA may determine it is necessary to issue a national waiver.

If you have any questions concerning the contents of this memorandum, you may contact us, or have your staff contact Jordan Dorfman, Attorney-Advisor, State Revolving Fund Branch, Municipal Support Division, at dorfman.jordan@epa.gov or (202) 564-0614 or Kiri Anderer, Environmental Engineer, Infrastructure Branch, Drinking Water Protection Division, at anderer.kirsten@epa.gov or (202) 564-3134.

Attachments

Appendix 1: Information Checklist for Waiver Request

The purpose of this checklist is to help ensure that all appropriate and necessary information is submitted to EPA. EPA recommends that States review this checklist carefully and provide all appropriate information to EPA. This checklist is for informational purposes only and does not need to be included as part of a waiver application.

Items	✓	Notes
<p>General</p> <ul style="list-style-type: none"> • Waiver request includes the following information: <ul style="list-style-type: none"> — Description of the foreign and domestic construction materials — Unit of measure — Quantity — Price — Time of delivery or availability — Location of the construction project — Name and address of the proposed supplier — A detailed justification for the use of foreign construction materials • Waiver request was submitted according to the instructions in the memorandum • Assistance recipient made a good faith effort to solicit bids for domestic iron and steel products, as demonstrated by language in requests for proposals, contracts, and communications with the prime contractor 		
<p>Cost Waiver Requests</p> <ul style="list-style-type: none"> • Waiver request includes the following information: <ul style="list-style-type: none"> — Comparison of overall cost of project with domestic iron and steel products to overall cost of project with foreign iron and steel products — Relevant excerpts from the bid documents used by the contractors to complete the comparison — Supporting documentation indicating that the contractor made a reasonable survey of the market, such as a description of the process for identifying suppliers and a list of contacted suppliers 		
<p>Availability Waiver Requests</p> <ul style="list-style-type: none"> • Waiver request includes the following supporting documentation necessary to demonstrate the availability, quantity, and/or quality of the materials for which the waiver is requested: <ul style="list-style-type: none"> — Supplier information or pricing information from a reasonable number of domestic suppliers indicating availability/delivery date for construction materials — Documentation of the assistance recipient's efforts to find available domestic sources, such as a description of the process for identifying suppliers and a list of contacted suppliers. — Project schedule — Relevant excerpts from project plans, specifications, and permits indicating the required quantity and quality of construction materials • Waiver request includes a statement from the prime contractor and/or supplier confirming the non-availability of the domestic construction materials for which the waiver is sought • Has the State received other waiver requests for the materials described in this waiver request, for comparable projects? 		

Appendix 2: HQ Review Checklist for Waiver Request

Instructions: To be completed by EPA. Review all waiver requests using the questions in the checklist, and mark the appropriate box as Yes, No or N/A. Marks that fall inside the shaded boxes may be grounds for denying the waiver. If none of your review markings fall into a shaded box, the waiver is eligible for approval if it indicates that one or more of the following conditions applies to the domestic product for which the waiver is sought:

1. The iron and/or steel products are not produced in the United States in sufficient and reasonably available quantities and of a satisfactory quality.
2. The inclusion of iron and/or steel products produced in the United States will increase the cost of the overall project by more than 25 percent.

Review Items	Yes	No	N/A	Comments
Cost Waiver Requests				
<ul style="list-style-type: none"> • Does the waiver request include the following information? <ul style="list-style-type: none"> — Comparison of overall cost of project with domestic iron and steel products to overall cost of project with foreign iron and steel products — Relevant excerpts from the bid documents used by the contractors to complete the comparison — A sufficient number of bid documents or pricing information from domestic sources to constitute a reasonable survey of the market • Does the Total Domestic Project exceed the Total Foreign Project Cost by more than 25%? 				
Availability Waiver Requests				
<ul style="list-style-type: none"> • Does the waiver request include supporting documentation sufficient to show the availability, quantity, and/or quality of the iron and/or steel product for which the waiver is requested? <ul style="list-style-type: none"> — Supplier information or other documentation indicating availability/delivery date for materials — Project schedule — Relevant excerpts from project plans, specifications, and permits indicating the required quantity and quality of materials • Does supporting documentation provide sufficient evidence that the contractors made a reasonable effort to locate domestic suppliers of materials, such as a description of the process for identifying suppliers and a list of contacted suppliers? • Based on the materials delivery/availability date indicated in the supporting documentation, will the materials be unavailable when they are needed according to the project schedule? (By item, list schedule date and domestic delivery quote date or other relevant information) • Is EPA aware of any other evidence indicating the non-availability of the materials for which the waiver is requested? Examples include: <ul style="list-style-type: none"> — Multiple waiver requests for the materials described in this waiver request, for comparable projects in the same State — Multiple waiver requests for the materials described in this waiver request, for comparable projects in other States — Correspondence with construction trade associations indicating the non-availability of the materials • Are the available domestic materials indicated in the bid documents of inadequate quality compared those required by the project plans, specifications, and/or permits? 				

Appendix 3: Example Loan Agreement Language

ALL ASSISTANCE AGREEMENT MUST HAVE A CLAUSE REQUIRING COMPLIANCE WITH THE AIS REQUIREMENT. THIS IS AN EXAMPLE OF WHAT COULD BE INCLUDED IN SRF ASSISTANCE AGREEMENTS. EPA MAKES NO CLAIMS REGARDING THE LEGALITY OF THIS CLAUSE WITH RESPECT TO STATE LAW:

Comply with all federal requirements applicable to the Loan (including those imposed by the 2014 Appropriations Act and related SRF Policy Guidelines) which the Participant understands includes, among other, requirements that all of the iron and steel products used in the Project are to be produced in the United States (“American Iron and Steel Requirement”) unless (i) the Participant has requested and obtained a waiver from the Agency pertaining to the Project or (ii) the Finance Authority has otherwise advised the Participant in writing that the American Iron and Steel Requirement is not applicable to the Project.

Comply with all record keeping and reporting requirements under the Clean Water Act/Safe Drinking Water Act, including any reports required by a Federal agency or the Finance Authority such as performance indicators of program deliverables, information on costs and project progress. The Participant understands that (i) each contract and subcontract related to the Project is subject to audit by appropriate federal and state entities and (ii) failure to comply with the Clean Water Act/Safe Drinking Water Act and this Agreement may be a default hereunder that results in a repayment of the Loan in advance of the maturity of the Bonds and/or other remedial actions.

Appendix 4: Sample Construction Contract Language

ALL CONTRACTS MUST HAVE A CLAUSE REQUIRING COMPLIANCE WITH THE AIS REQUIREMENT. THIS IS AN EXAMPLE OF WHAT COULD BE INCLUDED IN ALL CONTRACTS IN PROJECTS THAT USE SRF FUNDS. EPA MAKES NO CLAIMS REGARDING THE LEGALITY OF THIS CLAUSE WITH RESPECT TO STATE OR LOCAL LAW:

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

Appendix 5: Sample Certifications

The following information is provided as a sample letter of **step** certification for AIS compliance. Documentation must be provided on company letterhead.

Date

Company Name

Company Address

City, State Zip

Subject: American Iron and Steel Step Certification for Project (XXXXXXXXXX)

I, (company representative), certify that the (melting, bending, coating, galvanizing, cutting, etc.) process for (manufacturing or fabricating) the following products and/or materials shipped or provided for the subject project is in full compliance with the American Iron and Steel requirement as mandated in EPA's State Revolving Fund Programs.

Item, Products and/or Materials:

1. Xxxx
2. Xxxx
3. Xxxx

Such process took place at the following location:

If any of the above compliance statements change while providing material to this project we will immediately notify the prime contractor and the engineer.

Signed by company representative

The following information is provided as a sample letter of certification for AIS compliance. Documentation must be provided on company letterhead.

Date

Company Name

Company Address

City, State Zip

Subject: American Iron and Steel Certification for Project (XXXXXXXXXXXX)

I, (company representative), certify that the following products and/or materials shipped/provided to the subject project are in full compliance with the American Iron and Steel requirement as mandated in EPA's State Revolving Fund Programs.

Item, Products and/or Materials:

1. XXXX
2. XXXX
3. XXXX

Such process took place at the following location:

If any of the above compliance statements change while providing material to this project we will immediately notify the prime contractor and the engineer.

Signed by company representative

DOCUMENT 00828.01

UTILITY TELEPHONE NUMBERS

Section 01060 of the Contract Documents is amplified for this Contract by the following:

The utility mains, ducts, poles and services in the construction area where shown on the Contract plans are at the approximate locations furnished by various utilities concerned. These locations are subject to possible errors in the source of the information and also errors in transcription.

The Contractor shall be responsible to make certain of the exact location of the mains, ducts, poles and services prior to excavation.

State law makes it mandatory to notify utilities before digging with power equipment. The Contractor shall call 1-800-922-4455 (toll free), 7:00 a.m. to 6:00 p.m., Monday through Friday, at least 48 hours prior to beginning the excavation. This "one-call" service is provided by the utility companies.

Once the call is made it is the utilities' responsibility to analyze the site and identify and mark their underground facilities.

The following more commonly used utility numbers are listed for the Contractor's convenience in case additional specific information is needed.

Connecticut Natural Gas Corporation
77 Hartland Street, 1st Floor, East Hartford, CT 06108
Telephone (860) 727-3206 (or Vasant Patel 860-727-3114)

Town of Montville WPCA (Water and Sewer)
310 Norwich-New London Turnpike, Uncasville, Connecticut 06382
Telephone (860) 848-3030 ext 7 (or Brian Lynch 860-848-3030 ext. 311)

The Connecticut Light & Power Company/Northeast Utilities
410 Sheldon Street, Hartford, CT 06106
Telephone 1-800-286-2000 (or Donald Holmes, Senior Consultant 860-280-2443; Roger Eisner, Distribution Asset Management Circuit Owner 860-280-2252)

AT&T Long Distance
75 Pent Highway, Wallingford, CT 06492
Mark Burkhardt, 203-269-4338 (mobile: 201-755-5441)

Comcast
19 Tuttle Place, Middletown, CT 06457
David Herzog, Construction Coordinator 860-613-3066 (mobile: 860-883-6024)

END OF DOCUMENT

DOCUMENT 00830.01

WAGE DETERMINATION SCHEDULE

00830.01 CONNECTICUT WAGE RATES. Connecticut minimum wage rates, if required for this contract, are included following this page;

“CONNECTICUT DEPARTMENT OF LABOR WAGE RATES”

(TO BE INSERTED)

END OF DOCUMENT



THIS IS A PUBLIC WORKS PROJECT

Covered by the

PREVAILING WAGE LAW

CT General Statutes Section 31-53

**If you have QUESTIONS regarding your wages
CALL (860) 263-6790**

Section 31-55 of the CT State Statutes requires every contractor or subcontractor performing work for the state to post in a prominent place the prevailing wages as determined by the Labor Commissioner.

Sec. 31-53b. Construction safety and health course. New miner training program. Proof of completion required for mechanics, laborers and workers on public works projects. Enforcement. Regulations. Exceptions. (a) Each contract for a public works project entered into on or after July 1, 2009, by the state or any of its agents, or by any political subdivision of the state or any of its agents, described in subsection (g) of section 31-53, shall contain a provision requiring that each contractor furnish proof with the weekly certified payroll form for the first week each employee begins work on such project that any person performing the work of a mechanic, laborer or worker pursuant to the classifications of labor under section 31-53 on such public works project, pursuant to such contract, has completed a course of at least ten hours in duration in construction safety and health approved by the federal Occupational Safety and Health Administration or, has completed a new miner training program approved by the Federal Mine Safety and Health Administration in accordance with 30 CFR 48 or, in the case of telecommunications employees, has completed at least ten hours of training in accordance with 29 CFR 1910.268.

(b) Any person required to complete a course or program under subsection (a) of this section who has not completed the course or program shall be subject to removal from the worksite if the person does not provide documentation of having completed such course or program by the fifteenth day after the date the person is found to be in noncompliance. The Labor Commissioner or said commissioner's designee shall enforce this section.

(c) Not later than January 1, 2009, the Labor Commissioner shall adopt regulations, in accordance with the provisions of chapter 54, to implement the provisions of subsections (a) and (b) of this section. Such regulations shall require that the ten-hour construction safety and health courses required under subsection (a) of this section be conducted in accordance with federal Occupational Safety and Health Administration Training Institute standards, or in accordance with Federal Mine Safety and Health Administration Standards or in accordance with 29 CFR 1910.268, as appropriate. The Labor Commissioner shall accept as sufficient proof of compliance with the provisions of subsection (a) or (b) of this section a student course completion card issued by the federal Occupational Safety and Health Administration Training Institute, or such other proof of compliance said commissioner deems appropriate, dated no earlier than five years before the commencement date of such public works project.

(d) This section shall not apply to employees of public service companies, as defined in section 16-1, or drivers of commercial motor vehicles driving the vehicle on the public works project and delivering or picking up cargo from public works projects provided they perform no labor relating to the project other than the loading and unloading of their cargo.

(P.A. 06-175, S. 1; P.A. 08-83, S. 1.)

History: P.A. 08-83 amended Subsec. (a) by making provisions applicable to public works project contracts entered into on or after July 1, 2009, replacing provision re total cost of work with reference to Sec. 31-53(g), requiring proof in certified payroll form that new mechanic, laborer or worker has completed a 10-hour or more construction safety course and adding provision re new miner training program, amended Subsec. (b) by substituting "person" for "employee" and adding "or program", amended Subsec. (c) by adding "or in accordance with Federal Mine Safety and Health Administration Standards" and setting new deadline of January 1, 2009, deleted former Subsec. (d) re "public building", added new Subsec. (d) re exemptions for public service company employees and delivery drivers who perform no labor other than delivery and made conforming and technical changes, effective January 1, 2009.

Informational Bulletin

THE 10-HOUR OSHA CONSTRUCTION SAFETY AND HEALTH COURSE, PROGRAM OR TRAINING

(Applicable to public works contracts as described by Conn. Gen. Stat. § 31-53(g)
entered into *on or after July 1, 2009*)

- (1) This requirement was created by Public Act No. 08-83, which is codified in Section 31-53b of the Connecticut General Statutes;
- (2) The course, program or training is required for public works contracts as described by Conn. Gen. Stat. § 31-53(g) entered into on or after July 1, 2009;
- (3) It is required of private workers (not state or municipal workers) and apprentices who perform the work of a mechanic, laborer or worker pursuant to the classifications of labor under Conn. Gen. Stat. § 31-53 on a public works project as described by Conn. Gen. Stat. § 31-53(g);
- (4) The ten-hour construction safety and health course, program or training pertains to the ten-hour Outreach Course conducted in accordance with federal OSHA Training Institute standards, a new mining training program approved by the Federal Mine Safety and Health Administration in accordance with 30 C.F. R. 48, or, for telecommunications workers, a ten-hour training course conducted in accordance with federal OSHA standard, 29 CFR 1910.268;
- (5) The internet website for the federal OSHA Training Institute is http://www.osha.gov/fso/ote/training/edcenters/fact_sheet.html;
- (6) The statutory language leaves it to the contractor and its employees to determine who pays for the cost of the ten-hour Outreach Course;
- (7) Proof of course, program or training completion shall be demonstrated through the presentation of a “completion document” (card, document, certificate or other written record issued by federal OSHA or by the Federal Mine Safety and Health Administration) as defined by Conn. State Agencies Regs. § 31-53b-1(2).
- (8) Any completion document with an issuance date more than 5 years prior to the commencement date of the public works project shall not constitute proof of compliance with § 31-53b;
- (9) For each person who performs the duties of a mechanic, laborer or worker on a public works project, the contractor shall affix a copy of the completion document

- to the certified payroll required to be submitted to the contracting agency for such project on which such worker's name first appears;
- (10) Any mechanic, laborer or worker on a public works project found to be in non-compliance shall be subject to removal from the project if such employee does not provide satisfactory proof of course completion to the Labor Commissioner by the fifteenth day after the date the employee is determined to be in noncompliance;
 - (11) Any such employee who is determined to be in noncompliance may continue to work on a public works project for a maximum of fourteen consecutive calendar days while bringing his or her status into compliance;
 - (12) The statute provides the minimum standards required for the completion of a construction safety and health course, program or training by employees on public works contracts; any contractor can exceed these minimum requirements.;
 - (13) Regulations pertaining to § 31-53b are located at Conn. State Agencies Regs. §31-53b-1 *et seq.*, and are effective May 5, 2009. The regulations are posted on the CTDOL website;
 - (14) Any questions regarding this statute or the regulations may be directed to the Wage and Workplace Standards Division of the Connecticut Labor Department via the internet website of <http://www.ctdol.state.ct.us/wgwkstnd/wgmenu.htm>; or by telephone at (860)263-6790.

THE ABOVE INFORMATION IS PROVIDED EXCLUSIVELY AS AN EDUCATIONAL RESOURCE, AND IS NOT INTENDED AS A SUBSTITUTE FOR LEGAL INTERPRETATIONS WHICH MAY ULTIMATELY ARISE CONCERNING THE CONSTRUCTION OF THE STATUTE OR THE REGULATIONS.

November 29, 2006

Notice
To All Mason Contractors and Interested Parties
Regarding Construction Pursuant to Section 31-53 of the
Connecticut General Statutes (Prevailing Wage)

The Connecticut Labor Department Wage and Workplace Standards Division is empowered to enforce the prevailing wage rates on projects covered by the above referenced statute.

Over the past few years the Division has withheld enforcement of the rate in effect for workers who operate a forklift on a prevailing wage rate project due to a potential jurisdictional dispute.

The rate listed in the schedules and in our Occupational Bulletin (see enclosed) has been as follows:

Forklift Operator:

- **Laborers (Group 4) Mason Tenders** - operates forklift solely to assist a mason to a maximum height of nine feet only.
- **Power Equipment Operator (Group 9)** - operates forklift to assist any trade and to assist a mason to a height over nine feet.

The U.S. Labor Department conducted a survey of rates in Connecticut but it has not been published and the rate in effect remains as outlined in the above Occupational Bulletin.

Since this is a classification matter and not one of jurisdiction, effective January 1, 2007 the Connecticut Labor Department will enforce the rate on each schedule in accordance with our statutory authority.

Your cooperation in filing appropriate and accurate certified payrolls is appreciated.

STATUTE 31-55a

- SPECIAL NOTICE -

To: All State and Political Subdivisions, Their Agents, and Contractors

Connecticut General Statute 31-55a - Annual adjustments to wage rates by contractors doing state work.

Each contractor that is awarded a contract on or after October 1, 2002, for (1) the construction of a state highway or bridge that falls under the provisions of section 31-54 of the general statutes, or (2) the construction, remodeling, refinishing, refurbishing, rehabilitation, alteration or repair of any public works project that falls under the provisions of section 31-53 of the general statutes shall contact the Labor Commissioner on or before July first of each year, for the duration of such contract, to ascertain the prevailing rate of wages on an hourly basis and the amount of payment or contributions paid or payable on behalf of each mechanic, laborer or worker employed upon the work contracted to be done, and shall make any necessary adjustments to such prevailing rate of wages and such payment or contributions paid or payable on behalf of each such employee, effective each July first.

- The prevailing wage rates applicable to any contract or subcontract awarded on or after October 1, 2002 are subject to annual adjustments each July 1st for the duration of any project which was originally advertised for bids on or after October 1, 2002.
- Each contractor affected by the above requirement 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 Web Site. The annual adjustments will be posted on the Department of Labor Web page: www.ctdol.state.ct.us. 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.

Any questions should be directed to the Contract Compliance Unit, Wage and Workplace Standards Division, Connecticut Department of Labor, 200 Folly Brook Blvd., Wethersfield, CT 06109 at (860)263-6790.

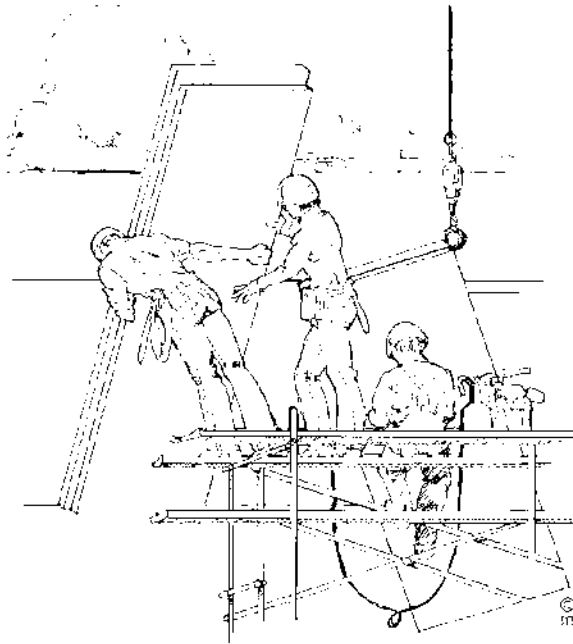
~NOTICE~

TO ALL CONTRACTING AGENCIES

Please be advised that Connecticut General Statutes Section 31-53, requires the contracting agency to certify to the Department of Labor, the total dollar amount of work to be done in connection with such public works project, regardless of whether such project consists of one or more contracts.

Please find the attached “Contracting Agency Certification Form” to be completed and returned to the Department of Labor, Wage and Workplace Standards Division, Public Contract Compliance Unit.

 Inquiries can be directed to (860)263-6543.



CONNECTICUT DEPARTMENT OF LABOR
WAGE AND WORKPLACE STANDARDS DIVISION
CONTRACT COMPLIANCE UNIT

CONTRACTING AGENCY CERTIFICATION FORM

I, _____, acting in my official capacity as _____,
authorized representative title

for _____, located at _____,
contracting agency address

do hereby certify that the total dollar amount of work to be done in connection with
_____, located at _____,
project name and number address

shall be \$_____, which includes all work, regardless of whether such project
consists of one or more contracts.

CONTRACTOR INFORMATION

Name: _____

Address: _____

Authorized Representative: _____

Approximate Starting Date: _____

Approximate Completion Date: _____

Signature

Date

Return To: Connecticut Department of Labor
Wage & Workplace Standards Division
Contract Compliance Unit
200 Folly Brook Blvd.
Wethersfield, CT 06109

Date Issued: _____

CONNECTICUT DEPARTMENT OF LABOR
WAGE AND WORKPLACE STANDARDS DIVISION

CONTRACTORS WAGE CERTIFICATION FORM
Construction Manager at Risk/General Contractor/Prime Contractor

I, _____ of _____
Officer, Owner, Authorized Rep. Company Name

do hereby certify that the _____
Company Name

Street

City

and all of its subcontractors will pay all workers on the

Project Name and Number

Street and City

the wages as listed in the schedule of prevailing rates required for such project (a copy of which is attached hereto).

Signed

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

Notary Public

Return to:

Connecticut Department of Labor
Wage & Workplace Standards Division
200 Folly Brook Blvd.
Wethersfield, CT 06109

Rate Schedule Issued (Date): _____

[New] In accordance with Section 31-53b(a) of the C.G.S. each contractor shall provide a copy of the OSHA 10 Hour Construction Safety and Health Card for each employee, to be attached to the first certified payroll on the project.

In accordance with Connecticut General Statutes, 31-53 Certified Payrolls with a statement of compliance shall be submitted monthly to the contracting agency.			PAYROLL CERTIFICATION FOR PUBLIC WORKS PROJECTS WEEKLY PAYROLL					Connecticut Department of Labor Wage and Workplace Standards Division 200 Folly Brook Blvd. Wethersfield, CT 06109													
CONTRACTOR NAME AND ADDRESS:					SUBCONTRACTOR NAME & ADDRESS			WORKER'S COMPENSATION INSURANCE CARRIER													
PAYROLL NUMBER	Week-Ending Date	PROJECT NAME & ADDRESS								POLICY #											
										EFFECTIVE DATE:											
										EXPIRATION DATE:											
PERSON/WORKER, ADDRESS and SECTION	APPR RATE %	MALE/FEMALE AND RACE*	WORK CLASSIFICATION Trade License Type & Number - OSHA 10 Certification Number	DAY AND DATE						Total ST Hours	BASE HOURLY RATE	TYPE OF FRINGE BENEFITS Per Hour 1 through 6 (see back)	GROSS PAY FOR ALL WORK PERFORMED THIS WEEK	TOTAL DEDUCTIONS				GROSS PAY FOR THIS PREVAILING RATE JOB	CHECK # AND NET PAY		
				S	M	T	W	TH	F	S				Total O/T Hours	TOTAL FRINGE BENEFIT PLAN CASH	FICA	FEDERAL WITH-HOLDING			STATE WITH-HOLDING	LIST OTHER
				HOURS WORKED EACH DAY																	
													1. \$								
										\$			2. \$								
										Base Rate			3. \$								
													4. \$								
										\$			5. \$								
										Cash Fringe			6. \$								
										\$			1. \$								
										Base Rate			2. \$								
													3. \$								
													4. \$								
										\$			5. \$								
										Cash Fringe			6. \$								
12/9/2013		*IF REQUIRED																			
WWS-CPI		*SEE REVERSE SIDE																			
																		PAGE NUMBER ____OF			

***FRINGE BENEFITS EXPLANATION (P):**

Bona fide benefits paid to approved plans, funds or programs, except those required by Federal or State Law (unemployment tax, worker’s compensation, income taxes, etc.).

Please specify the type of benefits provided:

- 1) Medical or hospital care _____ 4) Disability _____
- 2) Pension or retirement _____ 5) Vacation, holiday _____
- 3) Life Insurance _____ 6) Other (please specify) _____

CERTIFIED STATEMENT OF COMPLIANCE

For the week ending date of _____,

I, _____ of _____, (hereafter known as Employer) in my capacity as _____ (title) do hereby certify and state:

Section A:

1. All persons employed on said project have been paid the full weekly wages earned by them during the week in accordance with Connecticut General Statutes, section 31-53, as amended. Further, I hereby certify and state the following:

- a) The records submitted are true and accurate;
- b) The rate of wages paid to each mechanic, laborer or workman and the amount of payment or contributions paid or payable on behalf of each such person to any employee welfare fund, as defined in Connecticut General Statutes, section 31-53 (h), are not less than the prevailing rate of wages and the amount of payment or contributions paid or payable on behalf of each such person to any employee welfare fund, as determined by the Labor Commissioner pursuant to subsection Connecticut General Statutes, section 31-53 (d), and said wages and benefits are not less than those which may also be required by contract;
- c) The Employer has complied with all of the provisions in Connecticut General Statutes, section 31-53 (and Section 31-54 if applicable for state highway construction);
- d) Each such person is covered by a worker’s compensation insurance policy for the duration of his employment which proof of coverage has been provided to the contracting agency;
- e) The Employer does not receive kickbacks, which means any money, fee, commission, credit, gift, gratuity, thing of value, or compensation of any kind which is provided directly or indirectly, to any prime contractor, prime contractor employee, subcontractor, or subcontractor employee for the purpose of improperly obtaining or rewarding favorable treatment in connection with a prime contract or in connection with a prime contractor in connection with a subcontractor relating to a prime contractor; and
- f) The Employer is aware that filing a certified payroll which he knows to be false is a class D felony for which the employer may be fined up to five thousand dollars, imprisoned for up to five years or both.

2. OSHA~The employer shall affix a copy of the construction safety course, program or training completion document to the certified payroll required to be submitted to the contracting agency for this project on which such persons name first appears.

 (Signature) (Title) Submitted on (Date)

PAYROLL CERTIFICATION FOR PUBLIC WORKS PROJECTS

WEEKLY PAYROLL

PERSON/WORKER, ADDRESS and SECTION	APPR RATE %	MALE/ FEMALE AND RACE*	WORK CLASSIFICATION	DAY AND DATE							Total ST Hours	BASE HOURLY RATE	TYPE OF FRINGE BENEFITS Per Hour 1 through 6 (see back)	GROSS PAY FOR ALL WORK PERFORMED THIS WEEK	TOTAL DEDUCTIONS				GROSS PAY FOR THIS PREVAILING RATE JOB	CHECK # AND NET PAY
				S	M	T	W	TH	F	S					FICA	FEDERAL WITH- HOLDING	STATE WITH- HOLDING	OTHER		
			Trade License Type & Number - OSHA 10 Certification Number								Total O/T Hours	\$ Base Rate	1. \$ 2. \$ 3. \$ 4. \$ 5. \$ 6. \$							
												\$ Cash Fringe	4. \$ 5. \$ 6. \$							
												\$ Base Rate	1. \$ 2. \$ 3. \$ 4. \$ 5. \$ 6. \$							
												\$ Cash Fringe	4. \$ 5. \$ 6. \$							
												\$ Base Rate	1. \$ 2. \$ 3. \$ 4. \$ 5. \$ 6. \$							
												\$ Cash Fringe	4. \$ 5. \$ 6. \$							
												\$ Base Rate	1. \$ 2. \$ 3. \$ 4. \$ 5. \$ 6. \$							
												\$ Cash Fringe	4. \$ 5. \$ 6. \$							

*IF REQUIRED

Information Bulletin ***Occupational Classifications***

The Connecticut Department of Labor has the responsibility to properly determine "job classification" on prevailing wage projects covered under C.G.S. Section 31-53(d).

Note: This information is intended to provide a sample of some occupational classifications for guidance purposes only. It is not an all-inclusive list of each occupation's duties. This list is being provided only to highlight some areas where a contractor may be unclear regarding the proper classification. If unsure, the employer should seek guidelines for CTDOL.

Below are additional clarifications of specific job duties performed for certain classifications:

- **ASBESTOS WORKERS**

Applies all insulating materials, protective coverings, coatings and finishes to all types of mechanical systems.

- **ASBESTOS INSULATOR**

Handle, install apply, fabricate, distribute, prepare, alter, repair, dismantle, heat and frost insulation, including penetration and fire stopping work on all penetration fire stop systems.

- **BOILERMAKERS**

Erects hydro plants, incomplete vessels, steel stacks, storage tanks for water, fuel, etc. Builds incomplete boilers, repairs heat exchanges and steam generators.

- **BRICKLAYERS, CEMENT MASONS, CEMENT FINISHERS, MARBLE MASONS, PLASTERERS, STONE MASONS, PLASTERERS. STONE MASONS, TERRAZZO WORKERS, TILE SETTERS**

Lays building materials such as brick, structural tile and concrete cinder, glass, gypsum, terra cotta block. Cuts, tools and sets marble, sets stone, finishes concrete, applies decorative steel, aluminum and plastic tile, applies cements, sand, pigment and marble chips to floors, stairways, etc.

- **CARPENTERS, MILLWRIGHTS. PILEDRIVERMEN. LATHERS. RESILEINT FLOOR LAYERS, DOCK BUILDERS, DIKERS, DIVER TENDERS**

Constructs, erects, installs and repairs structures and fixtures of wood, plywood and wallboard. Installs, assembles, dismantles, moves industrial machinery. Drives piling into ground to provide foundations for structures such as buildings and bridges, retaining walls for earth embankments, such as cofferdams. Fastens wooden, metal or rockboard lath to walls, ceilings and partitions of buildings, acoustical tile layer, concrete form builder. Applies firestopping materials on fire resistive joint systems only. Installation of curtain/window walls only where attached to wood or metal studs. Installation of insulated material of all types whether blown, nailed or attached in other ways to walls, ceilings and floors of buildings. Assembly and installation of modular furniture/furniture systems. Free-standing furniture is not covered. This includes free standing: student chairs, study top desks, book box desks, computer furniture, dictionary stand, atlas stand, wood shelving, two-position information access station, file cabinets, storage cabinets, tables, etc.

- **LABORER, CLEANING**

- The clean up of any construction debris and the general (heavy/light) cleaning, including sweeping, wash down, mopping, wiping of the construction facility and its furniture, washing, polishing, and dusting.

- **DELIVERY PERSONNEL**

- If delivery of supplies/building materials is to one common point and stockpiled there, prevailing wages are not required. If the delivery personnel are involved in the distribution of the material to multiple locations within the construction site then they would have to be paid prevailing wages for the type of work performed: laborer, equipment operator, electrician, ironworker, plumber, etc.

- An example of this would be where delivery of drywall is made to a building and the delivery personnel distribute the drywall from one "stockpile" location to further sub-locations on each floor. Distribution of material around a construction site is the job of a laborer or tradesman, and not a delivery personnel.

- **ELECTRICIANS**

Install, erect, maintenance, alteration or repair of any wire, cable, conduit, etc., which generates, transforms, transmits or uses electrical energy for light, heat, power or other purposes, including the Installation or maintenance of telecommunication, LAN wiring or computer equipment, and low voltage wiring. ****License required per Connecticut General Statutes: E-1,2 L-5,6 C-5,6 T-1,2 L-1,2 V-1,2,7,8,9.***

- **ELEVATOR CONSTRUCTORS**

Install, erect, maintenance and repair of all types of elevators, escalators, dumb waiters and moving walks. **License required by Connecticut General Statutes: R-1,2,5,6.*

- **FORK LIFT OPERATOR**

Laborers Group 4) Mason Tenders - operates forklift solely to assist a mason to a maximum height of nine (9) feet only.

Power Equipment Operator Group 9 - operates forklift to assist any trade, and to assist a mason to a height over nine (9) feet.

- **GLAZIERS**

Glazing wood and metal sash, doors, partitions, and 2 story aluminum storefronts. Installs glass windows, skylights, store fronts and display cases or surfaces such as building fronts, interior walls, ceilings and table tops and metal store fronts. Installation of aluminum window walls and curtain walls is the "joint" work of glaziers and ironworkers, which require equal composite workforce.

- **IRONWORKERS**

Erection, installation and placement of structural steel, precast concrete, miscellaneous iron, ornamental iron, metal curtain wall, rigging and reinforcing steel. Handling, sorting, and installation of reinforcing steel (rebar). Metal bridge rail (traffic), metal bridge handrail, and decorative security fence installation. Installation of aluminum window walls and curtain walls is the "joint" work of glaziers and ironworkers which require equal composite workforce.

- **INSULATOR**

- Installing fire stopping systems/materials for "Penetration Firestop Systems": transit to cables, electrical conduits, insulated pipes, sprinkler pipe penetrations, ductwork behind radiation, electrical cable trays, fire rated pipe penetrations, natural polypropylene, HVAC ducts, plumbing bare metal, telephone and communication wires, and boiler room ceilings.

- **LABORERS**

Acetylene burners, asphalt rakers, chain saw operators, concrete and power buggy operator, concrete saw operator, fence and guard rail erector (except metal bridge rail (traffic), decorative security fence (non-metal)).

installation.), hand operated concrete vibrator operator, mason tenders, pipelayers (installation of storm drainage or sewage lines on the street only), pneumatic drill operator, pneumatic gas and electric drill operator, powermen and wagon drill operator, air track operator, block paver, curb setters, blasters, concrete spreaders.

- **PAINTERS**

Maintenance, preparation, cleaning, blasting (water and sand, etc.), painting or application of any protective coatings of every description on all bridges and appurtenances of highways, roadways, and railroads. Painting, decorating, hardwood finishing, paper hanging, sign writing, scenic art work and drywall hhg for any and all types of building and residential work.

- **LEAD PAINT REMOVAL**

- Painter's Rate

1. Removal of lead paint from bridges.
2. Removal of lead paint as preparation of any surface to be repainted.
3. Where removal is on a Demolition project prior to reconstruction.

- Laborer's Rate

1. Removal of lead paint from any surface NOT to be repainted.
2. Where removal is on a *TOTAL* Demolition project only.

- **PLUMBERS AND PIPEFITTERS**

Installation, repair, replacement, alteration or maintenance of all plumbing, heating, cooling and piping. ****License required per Connecticut General Statutes: P-1,2,6,7,8,9 J-1,2,3,4 SP-1,2 S-1,2,3,4,5,6,7,8 B-1,2,3,4 D-1,2,3,4.***

- **POWER EQUIPMENT OPERATORS**

Operates several types of power construction equipment such as compressors, pumps, hoists, derricks, cranes, shovels, tractors, scrapers or motor graders, etc. Repairs and maintains equipment. ****License required, crane operators only, per Connecticut General Statutes.***

- **ROOFERS**

Covers roofs with composition shingles or sheets, wood shingles, slate or asphalt and gravel to waterproof roofs, including preparation of surface. (demolition or removal of any type of roofing and or clean-up of any and all areas where a roof is to be relaid.)

- **SHEETMETAL WORKERS**

Fabricate, assembles, installs and repairs sheetmetal products and equipment in such areas as ventilation, air-conditioning, warm air heating, restaurant equipment, architectural sheet metal work, sheetmetal roofing, and aluminum gutters. Fabrication, handling, assembling, erecting, altering, repairing, etc. of coated metal material panels and composite metal material panels when used on building exteriors and interiors as soffits, fascia, louvers, partitions, canopies, cornice, column covers, awnings, beam covers, cladding, sun shades, lighting troughs, spires, ornamental roofing, metal ceilings, mansards, copings, ornamental and ventilation hoods, vertical and horizontal siding panels, trim, etc. The sheet metal classification also applies to the vast variety of coated metal material panels and composite metal material panels that have evolved over the years as an alternative to conventional ferrous and non-ferrous metals like steel, iron, tin, copper, brass, bronze, aluminum, etc. Fabrication, handling, assembling, erecting, altering, repairing, etc. of architectural metal roof, standing seam roof, composite metal roof, metal and composite bathroom/toilet partitions, aluminum gutters, metal and composite lockers and shelving, kitchen equipment, and walk-in coolers. To include testing and air –balancing ancillary to installation and construction.

- **SPRINKLER FITTERS**

Installation, alteration, maintenance and repair of fire protection sprinkler systems.

****License required per Connecticut General Statutes: F-1,2,3,4.***

- **TILE MARBLE AND TERRAZZO FINISHERS**

Assists and tends the tile setter, marble mason and terrazzo worker in the performance of their duties.

- **TRUCK DRIVERS**

~How to pay truck drivers delivering asphalt is under REVISION~

Truck Drivers are required to be paid prevailing wage for time spent "working" directly on the site. These drivers remain covered by the prevailing wage for any time spent transporting between the actual construction location and facilities (such as fabrication, plants, mobile factories, batch plant, borrow pits, job headquarters, tool yards, etc.) dedicated exclusively, or nearly so, to performance of the contract or project, which are so located in proximity to the actual construction location that it is reasonable to include them. ****License required, drivers only, per Connecticut General Statutes.***

For example:

- Material men and deliverymen are not covered under prevailing wage as long as they are not directly involved in the construction process. If, they unload the material, they would then be covered by prevailing wage for the classification they are performing work in: laborer, equipment operator, etc.
- Hauling material off site is not covered provided they are not dumping it at a location outlined above.
- Driving a truck on site and moving equipment or materials on site would be considered covered work, as this is part of the construction process.

➤ *Any questions regarding the proper classification should be directed to:*
Public Contract Compliance Unit
Wage and Workplace Standards Division
Connecticut Department of Labor
200 Folly Brook Blvd, Wethersfield, CT 06109
(860) 263-6543.

**Connecticut Department of Labor
Wage and Workplace Standards Division
FOOTNOTES**

⇒ Please Note: If the “Benefits” listed on the schedule for the following occupations includes a letter(s) (+ a or + a+b for instance), refer to the information below.

Benefits to be paid at the appropriate prevailing wage rate for the listed occupation.

If the “Benefits” section for the occupation lists only a dollar amount, disregard the information below.

**Bricklayers, Cement Masons, Cement Finishers, Concrete Finishers, Stone Masons
(Building Construction) and
(Residential- Hartford, Middlesex, New Haven, New London and Tolland Counties)**

- a. Paid Holiday: Employees shall receive 4 hours for Christmas Eve holiday provided the employee works the regularly scheduled day before and after the holiday. Employers may schedule work on Christmas Eve and employees shall receive pay for actual hours worked in addition to holiday pay.

Elevator Constructors: Mechanics

- a. Paid Holidays: New Year’s Day, Memorial Day, Independence Day, Labor Day, Veterans’ Day, Thanksgiving Day, Christmas Day, plus the Friday after Thanksgiving.
- b. Vacation: Employer contributes 8% of basic hourly rate for 5 years or more of service or 6% of basic hourly rate for 6 months to 5 years of service as vacation pay credit.

Glaziers

- a. Paid Holidays: Labor Day and Christmas Day.

**Power Equipment Operators
(Heavy and Highway Construction & Building Construction)**

- a. Paid Holidays: New Year’s Day, Good Friday, Memorial day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day, provided the employee works 3 days during the week in which the holiday falls, if scheduled, and if scheduled, the working day before and the working day after the holiday. Holidays falling on Saturday may be observed on Saturday, or if the employer so elects, on the preceding Friday.

Ironworkers

- a. Paid Holiday: Labor Day provided employee has been on the payroll for the 5 consecutive work days prior to Labor Day.

Laborers (Tunnel Construction)

- a. Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day. No employee shall be eligible for holiday pay when he fails, without cause, to work the regular work day preceding the holiday or the regular work day following the holiday.

Roofers

- a. Paid Holidays: July 4th, Labor Day, and Christmas Day provided the employee is employed 15 days prior to the holiday.

Sprinkler Fitters

- a. Paid Holidays: Memorial Day, July 4th, Labor Day, Thanksgiving Day and Christmas Day, provided the employee has been in the employment of a contractor 20 working days prior to any such paid holiday.

Truck Drivers

(Heavy and Highway Construction & Building Construction)

- a. Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Christmas day, and Good Friday, provided the employee has at least 31 calendar days of service and works the last scheduled day before and the first scheduled day after the holiday, unless excused.

SECTION 00860
LIST OF DRAWINGS

Contract drawings that have the general and detailed titles of the following, accompany and form part of these specifications.

WWTF HEADWORKS IMPROVEMENTS PROJECT
MONVTILLE, CT
CONTACT NUMBER 2019-XX

See section 00500 9.1.10 of Agreement for List of Drawings.

Additional drawings showing details in accordance with which the work is to be constructed will be furnished from time to time by the Engineer and they shall become a part thereof.

END OF SECTION

INTERIM GUIDANCE FOR MINORITY BUSINESS ENTERPRISE
AND WOMEN'S BUSINESS ENTERPRISE REQUIREMENT
OF 40 CFR §33.240

I. PURPOSE

This interim guidance is for Regions to assist States, EPA assistance recipients, prime contractors, consultants, minority business owners and women's business owners in complying with EPA's Minority Business Enterprise (MBE) and Women's Business Enterprise (WBE) requirements in the Agency's procurement regulations, 40 C.F.R. Part 33. This guidance provides suggestions for carrying out the affirmative steps required by Office of Management and Budget Circular A-102, Attachment O, section 9 and included in EPA procurement regulations. Also included is a description of activities to be undertaken by EPA or delegated States, as well as suggestions for MBE/WBEs to take in pursuing opportunities for work in EPA-funded projects.

II. DEFINITIONS

- A. Minority Business Enterprise (MBE) [same as definition to be in final 40 C.F.R. 33.005]: A minority business enterprise is a business which is
1. certified as a minority business enterprise by a State or Federal agency, or
 2. an independent business concern which is at least 51 percent owned and controlled (as defined below) by minority group member(s). A minority group member is an individual who is a citizen of the United States and one of the following:
 - a. Black American
 - b. Hispanic American (with origins from Puerto Rico, Mexico, Cuba, South or Central America)
 - c. Native American (American Indian, Eskimo, Aleut, native Hawaiian)
 - d. Asian-Pacific American (with origins from Japan, China, the Philippines, Vietnam, Korea, Samoa, Guam, the U.S. Trust Territories of the Pacific, Northern Marianas, Laos, Cambodia, Taiwan or the Indian Subcontinent)
- B. Women's Business Enterprise (WBE) [same as definition to be in final 40 C.F.R. 33.005]: A women's business enterprise is a business which is
1. certified as such by a State or Federal agency; or
 2. an independent business concern which is at least 51 percent owned by a woman or women who also control and operate it. Determination of whether a business is at least 51 percent owned by a woman or women shall be made without regard to community property laws. For example, an otherwise qualified WBE which is 51 percent owned by a married woman in a community property state will not be disqualified because her husband has a 50 percent interest in her share. Similarly, a business which is 51 percent owned by a married man and 49 percent owned by an unmarried woman will not become a qualified WBE by virtue of his wife's 50 percent interest in his share of the business.
- C. Ownership and control
1. The minority or woman ownership's interest in the firm must be real, substantial and continuing. Such interest may include:
 - a. risk of loss/share of profit commensurate with the proportional ownership; and

January 2014

- b. receipt of the customary incidents of ownership, such as salary and/or intangible benefits.
- 2. A minority or woman owner must have and exercise the authority to independently control the business. The minority or woman owner need not be continually present to be deemed in control. Characteristics of control may include:
 - a. authority to sign bids and contracts,
 - b. making decisions in price negotiations,
 - c. incurring liabilities for the firm,
 - d. making final staffing decisions,
 - e. policy-making; and
 - f. making general company management decisions.
- 3. Only those firms performing a useful business function according to custom and practice in the industry are qualified as MBE's or WBE's. A merely as a passive conduit of funds to some other, non-minority firm where such activity is unnecessary to accomplish the project does not constitute a "useful business function according to custom and practice in the industry."
- D. Recipient – A party receiving federal financial assistance under an EPA program pursuant to a grant or cooperative agreement.
- E. Project – The scope of work from which a cooperative agreement, grant or grant amendment is awarded.
- F. Bidder – A party seeking to obtain a contract with a recipient through a competitive, advertise, sealed bid process.
- G. Offeror – A party seeking to obtain a contract with a recipient through a negotiated procurement process.

IV. EPA RESPONSIBILITIES

- A. Headquarters.
 - 1. The officer in charge of the assistance program (program office) has primary responsibility for implementation of the MBE/WBE program, in cooperation with the Office of Small and Disadvantaged Business Utilization (OSDBU).
 - 2. OSDBU is responsible for serving as the Agency focal point for inquiries on the MBE/WBE program, providing explanation of the program and guidance to MBEs and WBEs interested in working on EPA funded projects.
- B. Regional Responsibilities
 - 1. Provide guidance and advice to recipients as requested.
 - 2. Maintain lists* of those MBE and WBE firms which have participated in EPA funded projects. The Region may also add MBEs and WBEs requesting to be included on source lists. Such lists are for information purposes only, and shall carry a clear and prominent statement that the firms listed are neither endorsed nor guaranteed by EPA as bona fide, MBE//WBEs. It is not necessary to be on any list in order to qualify as a bona fide MBE/WBE.
 - 3. Monitor recipients for compliance with MBE/WBE requirements and for determining levels of MBE/WBE participation.

*Lists are available for review at the offices of the Owner, Engineer and DEP.

V. RECIPIENT RESPONSIBILITIES

- A. The recipient shall take affirmative steps to contract with MBEs and WBEs and ensure that its contractors and consultants take affirmative steps to contract with MBEs and WBEs during all phases of work funded or to be funded under an EPA assistance agreement. The recipient's affirmative steps as defined in EPA procurement regulations are the following:
1. When feasible, dividing the total work to be contracted into smaller tasks in the solicitation documents to permit MBE/WBE participation.
 2. Including qualified MBEs and WBEs on solicitation lists by drawing from the source lists of EPA Regional Offices and appropriate minority/women's business associations and agencies.
 3. Assuring that MBEs and WBEs are solicited whenever they are potential sources of services and supplies, for example, by:
 - a. Holding pre-bid conferences, with interested MBEs and WBEs in attendance when possible, to highlight the requirements of this program to prospective bidders,
 - b. Including this MBE/WBE interim guidance in request for proposals (RFP) and invitations for bids (IFB),
 - c. Publishing announcements of MBE/WBE opportunities for work in EPA funded projects,
 - d. Developing a source list of MBE/WBEs and providing its list to prospective bidders/offerors.
 1. The recipient may wish to engage an MBE/WBE liaison to compile the list.
 2. The recipient may wish to use available lists such as those of the EPA Regional Office, adjacent municipalities, appropriate minority/women associations and agencies, and available industry associations. Names of these agencies with address and phone number should also be included on the recipient source list.
 - e. Providing necessary and appropriate liaison services between MBE/WBEs and prospective bidders/offerors. (Liaison services should not be delegated to consultants where a potential for conflict of interest exists).
 4. When project requirements permit, establishing delivery schedules which encourage participation of MBE/WBEs.
 5. Using the services and assistance of the Small Business Administration (SBA), the Minority Business Development Agency (MBDA), and other federal, State and local agencies when appropriate.
- B. Unless otherwise provided in the specifications, compliance with the MBE/WBE requirements in the regulations is a matter of bidder/offeror responsibility.
- C. The recipient is responsible for monitoring work in progress to insure that MBE and WBE subcontractors and joint ventures are actually participating in the performance of the subcontract or joint venture contract and to insure that the consultant/contractor is fulfilling its obligations with respect to MBE/WBE requirements under the contract.
- D. As part of the documentation required under 40 C.F.R. 33.250, the recipient shall maintain and update records of MBE/WBE participation and supply data to the Region or delegated State when requested. Such records may include:

1. name of MBE/WBEs being utilized;
2. work designated to be performed by MBE/WBE;
3. dollar value of that work;
4. portion of project being performed by MBEs and WBEs

VI. BIDDER AND OFFEROR RESPONSIBILITIES

- A. Affirmative Steps: Activities during preparation of bids and offers. Bidders/offerors shall take affirmative steps in compliance with the regulations, prior to submission of bids or closing date for recipient of initial offers, to encourage participation in projects by MBEs and WBEs. Such efforts include:
1. When feasible, segmenting total work requirements to permit maximum MBE/WBE participation.
 2. Assuring that MBEs and WBEs are solicited whenever they are potential sources of goods or services. This step may include:
 - a. Sending letters or making other personal contacts with MBEs and WBEs (e.g., those whose names appear on lists prepared by EPA or the recipient and other MBE/WBEs known to the bidder/offeror). MBEs and WBEs should be contacted when other potential subcontractors are contacted, within reasonable time prior to bid submission or closing date for receipt of initial offers. Those letters or other contacts should communicate the following:
 1. Specific description of the work to be subcontracted,
 2. How and where to obtain a copy of plans and specifications or other detailed information needed to prepare a detailed price quotation,
 3. date the quotation is due to the bidder/offeror,
 4. name, address, and phone number of the person in the bidder/offeror's firm whom the prospective MBE/WBE subcontractor should contact for additional information.
 - b. Sending letters or making other personal contacts with local, State, federal and private agencies and MBE/WBE associations relevant to the project. Such contacts should provide the same information provided in the direct contacts to MBE and WBE firms.
 3. Where feasible, establishing delivery schedules which will encourage participation by MBEs and WBEs.
- B. Bidders/offerors must demonstrate compliance with MBE/WBE requirements in order to be deemed responsible. Demonstration of compliance may include the following information, however the recipient may specify other methods of demonstrating compliance:
1. Names, addresses and phone numbers of MBE/WBEs expected to perform work;
 2. Work to be performed by the MBE and WBEs;
 3. Aggregate dollar amount of work to be performed by MBEs and WBEs, showing aggregate to MBEs and aggregate to WBEs separately;
 4. Description of contacts to MBE and WBE organizations, agencies and associations which service MBEs/WBEs, including names of organizations, agencies and associations and dates of contacts;
 5. Description of contacts to MBEs and WBEs, including number of contacts, fields, (i.e., equipment or material supplier, excavators,

transport services, electrical subcontractors, plumbers, etc.) and date of contacts.

- C. Successful bidders/offerors should take reasonable affirmative steps to subcontract with MBEs and WBEs whenever additional subcontracting opportunities arise during the performance of the contract.

VII. MBE AND WBE RESPONSIBILITIES

MBEs and WBEs are responsible for promoting themselves and taking the initiative to obtain contracts and subcontracts, and for encouraging joint venture arrangements. MBEs/WBEs interested in working on EPA funded projects are strongly encouraged to take the following steps:

- A. Submit information to take the recipients to identify status as a MBE/WBE.
- B. Become certified as MBE/WBE under available State or federal agency procedures.
- C. Contact federal, State, and local MBE/WBE liaison offices to obtain information on potential jobs.
- D. Provide capability statements to State agencies, recipients, consulting engineers, and contractors stating type(s) of work performed by the firm, size of job that the firm could handle, bonding information, and any special skills.
- E. Make every effort to establish contacts and relationships with contractors for potential future business, including attending pre-bid conferences and subscribing to industry and trade journals.
- F. Contact EPA Regional offices or appropriate State offices to obtain information on planned EPA-funded projects.
- G. Respond promptly to solicitation requests.

VIII. REMEDIES FOR NONCOMPLIANCE

- A. Protests. A bidder/offeror for EPA funded work or MBE/WBE with an adversely affected direct financial interest may file a bid protest with the recipient pursuant to EPA procurement regulations (40 C.F.R. 33.1106 *et. seq.*). These procedures are available to protest alleged violation of federal MBE/WBE requirements and may not be used to enforce local or State MBE/WBE requirements.
- B. Upon a finding by EPA that a recipient, bidder/offeror, consultant, contractor or subcontractor has not complied with the MBE/WBE requirements of EPA regulations, EPA may invoke any and all sanctions and remedies specified in EPA regulations.

IX. STATE OR LOCAL LAW

Nothing in this program prevents a State or recipient from applying more stringent MBE/WBE requirements or procurement obligations which pertain to bid responsiveness or percentage of MBE and WBE participation.

DIVISION 01
GENERAL REQUIREMENTS

SECTION 01010
SUMMARY OF WORK

PART 1 - GENERAL

1.1 LOCATION OF WORK

- A. The work of this Contract is located at the existing Water Pollution Control Facility at 83 Pink Row, Town of Uncasville, Connecticut, as shown on the Drawings.

1.2 WORK TO BE DONE

- A. Furnish all labor, materials, equipment and incidentals required and perform the Work in its entirety as shown on the Drawings and as specified herein.
- B. The Work of this contract consists of, but is not necessarily limited to, furnishing all labor, materials and equipment to perform improvements to the Headworks Facility. The work shall include:
 - 1. Installation, maintenance and removal of erosion and sedimentation controls;
 - 2. Site clearing;
 - 3. Site excavation and grading;
 - 4. Plumbing, and electric distribution and supply;
 - 5. Selective demolition;
 - 6. Construction of concrete structures.
 - 7. Yard piping;
 - 8. Paving;
 - 9. Installation and start-up of Contractor furnished equipment and operator training;
 - 10. Plant Water Modifications
 - 11. Site restoration;
 - 12. All other appurtenant work and cleanup necessary to complete the work of this project.

1.3 WORK BY OTHERS

- A. Not in use

1.4 ABBREVIATIONS

- A. Abbreviation List
 - 1. AASHTO The American Association of State Highway and Transportation Officials
 - 2. ACI – American Concrete Institute
 - 3. AISC – American Institute of Steel Construction
 - 4. ANSI – American National Standards Institute
 - 5. ASCE – America Society of Civil Engineers
 - 6. ASTM – American Society of Testing Materials

7. AWS – American Welding Society
 8. AWWA – American Water Works Association
 9. DIPRA – Ductile Iron Pipe Research Association
 10. Fed. Spec. Federal Specifications
 11. NEWWA New England Water Works Association
 12. NCPI National Clay Pipe Institute
 13. OSHA Occupational Safety and Health Act
- B. Where reference is made to a specification by one of the above-mentioned or other associations, it is understood that the latest revisions thereof shall apply.
- C. In case of conflict, this specification shall take precedence over the above-noted specifications.

END OF SECTION

SECTION 01014

SCOPE AND SEQUENCE OF WORK

PART 1 - GENERAL

1.1 GENERAL

- A. This Section of the specifications covers the scope and sequence of work for the "WWTF Headworks Improvements Project: Contract Number 2021-5.
- B. The Contractor shall furnish all labor, materials, equipment, and incidentals required to complete the work as shown on the drawings and as specified herein.

1.2 SCOPE OF WORK

- A. As described in Section 01010.

1.3 WORK HOURS

- A. All work shall be performed between the hours of 7:00 AM and 5 PM. All proposed workhours shall be submitted to the TOWN for approval. Contractor shall obtain written approval prior to commencement of any work.

PART 2 - PRODUCTS (NOT USED)

PART 3 - CONSTRUCTION SEQUENCE

- A. Execute agreement and submit insurance and bonds.
- B. Submit schedule of values.
- C. Submit Health and Safety Plan.
- D. Submit schedule, shop drawings, and other technical submittals.
- E. Acquire all permits.
- F. Submit excavation support plans and design
- G. Submit location of off-site disposal area(s).
- H. Complete work to be done as described in Section 01010.

SECTION 01025

MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.1 INSTALLATION OF NEW GRIT CLASSIFIER, SEPARATOR, AND MODIFICATIONS:
(Item 1)

A. Measurement

1. "Installation Of New Grit Classifier And Separator Modifications", (Item 1), shall be measured on a lump sum basis.

B. Payment

1. Payment for " Installation Of New Grit Classifier And Separator Modifications " (Item 1), will be at the lump sum price bid as listed in the Schedule of Prices. This price and payment shall be full compensation for furnishing all labor, materials and equipment required to do all work of this Contract as specified in the specifications, or as shown on the Drawings and any other miscellaneous work not specifically included for payment under any other item, but necessary to complete the Contract. Partial payments shall be based on the breakdown of the items as specified in the Section 01370-Schedule of Values.

1.2 INSTALLATION OF PLANT WATER MODIFICATIONS (Item 2)

A. Measurement

1. "Installation of Plant Water Modifications", (Item 2) shall be measured on a lump sump basis.

B. Payment

1. Payment for " Installation Of Plant Water Modifications " (Item 2), will be at the lump sum price bid as listed in the Schedule of Prices. This price and payment shall be full compensation for furnishing all labor, materials and equipment required to do all work of this Contract as specified in the specifications, or as shown on the Drawings and any other miscellaneous work not specifically included for payment under any other item, but necessary to complete the Contract. Partial payments shall be based on the breakdown of the items as specified in the Section 01370-Schedule of Values.

WWTF HEADWORKS IMPROVMENTS
MONTVILLE WPCA

MEASUREMENT AND PAYMENT
CONTRACT 2021-5

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01035

MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 CHANGE ORDER PROCEDURES

- A. In general, Change Orders will be issued for correction of Contract documents which will eliminate errors, omissions or discrepancies in the work; for incorporating changes in Town requirements, including additions or deletions in the work; for unforeseen field conditions which necessitate changes in the work; changes in code provisions or other requirements of Federal, State and local authority requiring changes in the work; changes in the availability of products or for incorporating new products into the work and for changes directed by the Engineer for the benefit of the Town.
- B. Authority to execute Change Orders shall be that of the Town and not of the Contractor. Change Orders will, in general, originate by a "Change Order Proposal Request" or by issuance of a "Construction Change Authorization".
- C. Unless authorized by the Engineer, no work shall be performed that is involved in the change until a formal Change Order is issued.
- D. To initiate a Change Order, the Engineer will forward a Change Order proposal request describing the proposed changes and if required, include additional or revised drawings and specifications soliciting a formal quotation of cost and time to incorporate and complete the proposed Change Order work. Upon reaching mutual agreement on the cost and time, the Engineer will sign his approval of the Change Order and submit it to the Contractor for his full signature of acceptance.
- E. The Engineer may, to avoid costly removal of or alterations to present on-going work, issue a Work Directive Change authorizing the Contractor to proceed, subject to later negotiation of the price of the change.

1.2 PRICE AGREEMENTS

- A. Prices agreed upon to cover the Change Orders may be either by unit prices as stated in the Contract bid proposal or actual direct cost plus fifteen (15%) percent of actual cost (5% if work performed by subcontractor) for overhead, profit and other expenses consistent with Article 12 of the General Conditions.
- B. Method for computing the cost of the change shall be based on the net additional increase. No overhead and profit shall be deducted from prices for changes deleting work.
- C. The Change Order form document shall indicate the net adjustment (+/-) to the total Contract price as a result thereof including extension or reduction of time when applicable

WWTF HEADWORKS IMPROVMENTS
MONTVILLE WPCA

MODIFICATION PROCEDURES
CONTRACT 2021-5

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

SECTION 01040

COORDINATION

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Coordinate scheduling, submittal, work of subcontractors and Work of the various Sections of Specifications to assure efficient and orderly sequence of installation of interdependent construction elements.

1.2 RELATED WORK

- A. Summary of Work is included in Section 01010.
- B. Control of Work is included in Section 01046.
- C. Test Pits are included in Section 02015.

1.3 PROJECT COORDINATION

- A. Coordinate work with all utility companies necessary for completion of work under this contract.
- B. If there are conflicts that the Contractor cannot resolve, the Contractor shall notify the Owner's Representative immediately. The Owner's Representative will assist the Contractor in resolving the conflict.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

SECTION 01044

PROGRESS

PART 1 - GENERAL

1.1 COMMENCEMENT OF WORK - COMPLETION OF WORK

- A. See Contract Document Section 00300-Bid form for Commencement and Completion of Work.

1.2 TIME AND ORDER OF WORKING

- A. In order that the Work may be conducted with a minimum of inconvenience to the Owner or public, and that the work on this Contract may be coordinated with other work which may be under construction or contemplated, and, that Work under the Contract may conform to conditions under which it has been undertaken or conditions attached to the property for this work, the Engineer may determine the point or points and time or times when portions of the Work will be commenced or carried on and may issue orders pertaining thereto and relative to the rate of progress on the several portions of the work.
- B. In the event the Contractor has reason to think there has been a delay or may be delayed by any act or omission of the Town or any of its agents, or by any other cause beyond the control of the Contractor and that could not have been anticipated by the Contractor, the Contractor shall give notice thereof, in writing, to the Engineer as provided elsewhere herein and in the Contract Agreement.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

SECTION 01045

CUTTING, CORING AND PATCHING

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. This Section covers the cutting, coring, rough and finish patching of holes and openings in existing construction.
- B. All cutting, coring, and rough patching shall be performed by the Contractor. Finish patching shall be the responsibility of the Contractor and shall be performed by the trade associated with the application of the particular finish.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Concrete and grout for rough patching shall be as specified in Division 3.
- B. Materials for finish patching shall be equal to those of adjacent construction.

PART 3 - EXECUTION

3.1 GENERAL

- A. All cutting and coring shall be performed in such a manner as to limit the extent of patching.
- B. All holes cut through concrete and masonry walls, slabs or arches shall be core drilled unless otherwise approved. No structural members shall be cut without approval of the Engineer and all such cutting shall be done in a manner directed by him. No holes may be drilled in beams or other structural members without obtaining prior approval. All work shall be performed by mechanics skilled in this type of work.
- C. If holes are cored through floor slabs they shall be drilled from below.
- D. Rough patching shall be such as to bring the cut or cored area flush with existing construction unless otherwise shown. Finish patching shall match existing surfaces as approved.

3.2 CORING

- A. Coring shall be performed with an approved non-impact rotary tool with diamond core drills. Size of holes shall be suitable for pipe, conduit, sleeves, equipment or mechanical seals to be installed.

- B. All equipment shall conform to OSHA standards and specifications pertaining to plugs, noise and fume pollution, wiring and maintenance.
- C. Provide protection for existing equipment, utilities and critical areas against water or other damage caused by drilling operation.
- D. Slurry or tailings resulting from coring operations shall be vacuumed or otherwise removed from the area following drilling.

3.3 CUTTING

- A. Cutting shall be performed with a concrete wall saw and diamond saw blades of proper size.
- B. Provide for control of slurry generated by sawing operation on both sides of wall.
- C. When cutting a reinforced concrete wall, the cutting shall be done so as not damage bond between the concrete and reinforcing steel left in structure. Cut shall be made so that steel neither protrudes nor is recessed from face of the cut.
- D. Adequate bracing of area to be cut shall be installed prior to start of cutting. Check area during sawing operations for partial cracking and provide additional bracing as required to prevent a partial release of cut area during sawing operations.
- E. Provide equipment of adequate size to remove cut panel.

END OF SECTION

SECTION 01046
CONTROL OF WORK

PART 1 - GENERAL

1.1 PLANT

- A. Furnish plant and equipment, which will be efficient, appropriate and large enough to secure a satisfactory quality of work and a rate of progress which will insure the completion of the work within the Contract Time. If at any time such plant appears to the Engineer to be inefficient, inappropriate or insufficient for securing the quality of work required or for producing the rate of progress aforesaid, he/she may order the Contractor to increase the efficiency, change the character or increase the plant equipment and the Contractor shall conform to such order. Failure of the Engineer to give such order shall in no way relieve the Contractor of his/her obligations to the quality of the work and rate of progress required.
- B. The contractor shall not operate valves or any other appurtenance in order to disconnect or modify the existing sewer, water, or stormwater systems. The contractor shall be responsible for requesting in advance that the Town's authorized staff be present to operate valves and appurtenances when necessary.

1.2 PIPE LOCATIONS

- A. Pipelines shall be located substantially as indicated on the Drawings, but the Engineer reserves the right to make such modifications in locations as may be found desirable to avoid interference with existing structures, utilities, or for other reasons. Where fittings are noted on the Drawings, such notation is for the Contractor's convenience and does not relieve him/her from laying and jointing different or additional items where required.

1.3 OPEN EXCAVATIONS

- A. All open excavations shall be adequately safeguarded by providing temporary barricades, caution signs, lights and other means to prevent accidents to persons and damage to property. The Contractor shall, at his/her own expense, provide suitable and safe bridges and other crossings for accommodating travel by pedestrians and workmen. Bridges provided for access during construction shall be removed when no longer required. The length or size of excavation will be controlled by the particular surrounding conditions but shall always be confined to the limits prescribed by the Engineer. If the excavation becomes a hazard, or if it excessively restricts traffic at any point, the Engineer may require special construction procedures such as limiting the length of the open trench, prohibiting stacking excavated material in the street and requiring that the trench shall not remain open overnight.
- B. Take precautions to prevent injury to the public due to open trenches all trenches, excavated material, equipment, or other obstacles which could be dangerous to the public shall be well lighted at night.

1.4 CARE AND PROTECTION OF PROPERTY

- A. The Contractor shall be responsible for the preservation of all public and private property and use every precaution necessary to prevent damage thereto. If any direct or indirect damage is done to public or private property by or on account of any act, omission, neglect, or misconduct in the execution of the work on the part of the Contractor, such property shall be restored by the Contractor, at his/her expense, to a condition similar or equal to that existing before the damage was done, or he/she shall make good the damage in other manner acceptable to the Engineer.
- B. All sidewalks which are disturbed shall be restored to their original condition by the use of similar or comparable materials, unless otherwise shown on the Drawings. All curbing shall be restored in a condition equal to the original construction and in accordance with the best modern practice, unless otherwise shown on the Drawings.
- C. Along the location of this work all fences, walks, bushes, trees, shrubbery, and other physical features shall be protected and restored in a thoroughly workmanlike manner. Fences and other features removed shall be replaced in a location to satisfy the property owner or as indicated by the Engineer as soon as conditions permit. All grass areas beyond the limits of construction which have been damaged shall be regraded, seeded, and maintained until growth is established.
- D. Trees close to the work shall be boxed or otherwise protected against injury. Trim all branches that are liable to damage because of operations, but in no case shall any tree be cut or removed without prior notification of the tree warden. All injuries to bark, trunk, limbs, and roots of trees shall be repaired by dressing, cutting, and painting according to approved methods, using only approved tools and material.
- E. The protection, removal, and replacement of existing physical features along the line of work shall be a part of the work under the Contract, and all costs in connection therewith shall be included in the unit and/or lump sum prices established under the items in the Bid Form.

1.5 PROTECTION OF EXISTING STRUCTURES AND UTILITIES

- A. The Contractor shall assume full responsibility for the protection of all buildings, structures, and utilities, public or private, including poles, mailboxes, fences, signs, services to buildings, utilities in the street, gas pipes, water pipes, hydrants, sewers, drains and cable television, electric and telephone cables, whether or not they are shown on the Drawings. Carefully support and all such structures and utilities from injury of any kind. Any damage resulting from the Contractor's operations shall be repaired by him/her at his/her expense.
- B. Notify all utility companies in writing at least 72 hours (excluding Saturdays, Sundays, and Legal holidays) before excavating in any public way. Also notify Connecticut Call Before You Dig, telephone (800) 922-4455 at least 72 hour prior to start of work.
- C. Assistance will be given the Contractor in determining the location of existing services. The Contractor, however, shall bear full responsibility for obtaining all locations of underground structures and utilities (including existing water services, drain lines and sewers). Services to buildings shall be maintained, and all costs or charges resulting from damage thereto shall be paid by the Contractor. Where an existing service connection is shown to be relocated, or is directed by the Engineer to be relocated, the Contractor shall coordinate the Work with the utility company and the home/building owner.

- D. Protection of existing utilities and structures (culverts, water courses, storm drains, gas mains, water mains, cable TV, electric, telephone, gas and water services, etc) shall be a part of the work under the Contract and all costs in connection therewith shall be included in the Total Price Bid in the Bid Form.
- E. At pipe crossings, and where designated by the Engineer, the Contractor shall furnish and place screened gravel bedding so that the existing utility or pipe is firmly supported for its entire exposed length. The bedding shall extend to the mid-diameter of the pipe or utility crossed.

1.6 WATER FOR CONSTRUCTION PURPOSES

- A. Water provided by the Town: The contractor may use water from the Town's water distribution system at no cost to the Contractor for construction purposes, but must first obtain the necessary permits. If approved by the Town and hydrants are to be operated, the Contractor shall take precaution to prevent any damage to either the hydrant or the main. A proper hydrant wrench shall be used for opening and closing the hydrants. Any damage to any part of the water system resulting from misuse by the Contractor's employees or subcontractors shall be repaired at the Contractors expense and to Town specifications. If potable water is utilized in conjunction with other equipment the supply lines from the hydrants, or other sources, must be equipped with a suitable backflow prevention device to ensure against pollution of potable water in the event that a negative (suction) head develops. A special approval from Town Utility Services shall be secured by the Contractor before connecting any line to a hydrant.
- B. The contractor is responsible for obtaining a backflow prevention devices from the Town and for making arrangements with the Operations Agency regarding the selection of a hydrant for use. No more than one hydrant per week shall be used for refilling the contractors work truck.
- C. Any water provided by the Town shall be conserved and not used unnecessarily. Waste of water by the Contractor shall be sufficient cause for withdrawing the privilege of unrestricted use. Hydrants shall only be operated under the supervision of the Town's personnel.
- D. No hydrant shall be obstructed in case of a fire in the area served by the hydrant.
- E. When water restrictions are in place, Contractor will be required to abide by all water restrictions unless the Contractor receives written authorization otherwise from Town and provide all required water for construction from a private vendor.

1.7 MAINTENANCE OF FLOW

- A. The Contractor shall at his/her own cost, provide for the flow of sewers, drains and water courses interrupted during the progress of the work, and shall immediately cart away and remove all offensive matter. The entire procedure of maintaining existing flow shall be fully discussed with the Engineer well in advance of the interruption of any flow.

1.8 COOPERATION WITH THIS CONTRACT

- A. All firms or persons authorized to perform any work under this Contract shall cooperate with General Contractor and his/her Subcontractors or trades and shall assist in incorporating the work of other trades where necessary or required.

1.9 CLEANUP AND DISPOSAL OF EXCESS MATERIAL

- A. During the course of the work, keep the site of operations in as clean and neat a condition as is possible. Dispose of all residue resulting from the construction work and, at the conclusion of the work, remove and haul away any unsuitable surplus excavation, broken pavement, lumber, equipment, temporary structures and any other refuse remaining from the construction operations and leave the entire site of the work in a neat and orderly condition.
- B. In order to prevent environmental pollution arising from the construction activities related to the performance of this Contract, the contractor, and his/her subcontractors shall comply with all applicable Federal, State, and local laws and regulations concerning waste material disposal, as well as the specific requirements stated in this Section and elsewhere in the Specifications.
- C. Disposal of excess excavated material in wetlands, stream corridors and plains is strictly prohibited even if the permission of the property owner is obtained. Any violation of this restriction by the Contractor or any person employed by him/her, will be brought to the immediate attention of the responsible regulatory agencies, with a request that appropriate action be taken against the offending parties. Therefore, the Contractor will be required to remove the fill at his/her own expense and restore the area impacted.
- D. The disposal of all excess excavated material, piping, pavement, concrete and other materials is the responsibility of the Contractor. The Contractor must properly dispose of the material at his/her own expense. No disposal of material within the Town will be allowed without the permission of the Town.

1.10 NOISE LIMITATIONS

- A. All equipment to be furnished under this Contract, unless specified otherwise in the technical specifications, shall be designed to ensure that the sound pressure level does not exceed 85 decibels over a frequency range of 37.8 to 9600 cycles per second at a distance of 3-ft from any portion of the equipment, under any load condition, when tested using standard equipment and methods. Noise levels shall include the noise from the motor. Mufflers or external baffles shall not be acceptable for the purpose of reducing noise. Data on noise levels shall be included with the shop drawing submittal.

1.11 INCIDENT REPORTING

- A. The Contractor shall notify the Owners designated person at the onset of each Resident complaint or mishap that could lead to a complaint. An incident report is required to be submitted within two (2) hours following the incident and forwarded to the Owner's designee.

WWTF HEADWORKS IMPROVMENTS
MONTVILLE WPCA

CONTROL OF WORK
CONTRACT 2021-5

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION – NOT USED

END OF SECTION

SECTION 01050

FIELD ENGINEERING AND SURVEYING

PART 1 - GENERAL

1.1 REQUIREMENTS INCLUDED

- A. Provide field engineering and surveying services for stake out of all project features and structures as indicated on the Drawings and specified herein.
- B. Identify project benchmarks
- C. Provide surveys for Record Drawings.

1.2 QUALITY CONTROL

- A. The Contractor shall employ a Professional Land Surveyor (Surveyor) registered in The State of Connecticut and acceptable to Engineer. Surveyor shall establish all lines, elevations, reference marks, batterboards, etc., by the Contractor or Engineer during the progress of the Work, and from time to time to verify such marks by instrument or other appropriate means.
- B. The Engineer shall be permitted at all times to check the lines, elevations, reference marks, batterboards, etc., set by the Contractor, who will correct any errors in lines, elevations, reference marks, batterboards, etc., disclosed by such check. Such a check shall not be construed to be an approval of the Contractor Work and shall not relieve or diminish in any way the responsibility of the Contractor for the accurate and satisfactory construction and completion of the entire Work of this Project.
- C. At completion of the Work of this Project, the Contractor shall have Surveyor prepare record "asbuilt" drawings showing the of all Work installed and submit the "as-built" drawings to the Engineer for review. Certification of the "as-built" drawings by Surveyor is required. Submittal of the "as-built" drawings shall conform to requirements of Section 01720 and will be a prerequisite for approval of Application for Final Payment.

1.3 FIELD CONDITIONS AND MEASUREMENTS

- A. The Contractor shall base all measurements, both horizontal and vertical, from established benchmarks. The Contractor shall be responsible for field verification of all dimensions and conditions at the job site.
- B. Should the Contractor discover any discrepancy between actual conditions and those indicated on the Drawings, which prevent the following of good practice or the intent of the Drawings and Specifications, he shall notify the Engineer, request clarification and instructions, and shall not proceed with his Work until he has received instructions from the Engineer; provided that such wait does not unduly delay the progress of the Work.

- C. No claims shall be made for extra payment or extensions of Contract completion time if the Contractor fails to notify the Engineer of any discrepancy before proceeding

1.4 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Submit name, address, and telephone number of Surveyor to Engineer before starting Work.
- C. On request, submit documentation verifying accuracy of survey Work.
- D. Submit certificate signed by Surveyor, certifying that elevations and locations of improvements are in conformance, or non-conformance, with Contract Documents.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.1 INSPECTION

- A. Verify location of survey control points prior to starting Work. Promptly notify engineer of any discrepancies

END OF SECTION

SECTION 01060
REGULATORY REQUIREMENTS

PART 1 - GENERAL

1.1 TOWN PERMITS

- A. The Contractor will be required to obtain all necessary permits from the state, town or other authorities having jurisdiction for the digging of trenches in the streets or highways and all other necessary building and construction operations requiring permits. Any damage caused by the operations to any street, or existing structure either above or below the ground surface shall be repaired at no additional expense to the Town.
- B. The Contractor will be required to obtain, and pay all fees associated with, Town Excavation Permits. A copy for Town's files shall be furnished by the Contractor prior to undertaking any work within any Town road right-of-way.
- C. The Contractor will be required to obtain, and pay all fees associated with, State DOT Encroachment permits for work on State right of ways. A copy for Town's files shall be furnished by the Contractor prior to undertaking any work within any State road right-of-way.
- D. The cost of all or any permits secured shall be considered as having been included in the price or prices stated or bid in the Proposal. Copies of all necessary permits shall be submitted to and acknowledged by the Town prior to starting any work for which a permit is required.

1.2 SUBMITTALS

- A. Submit in accordance with Section 01300.
- B. Copies of all necessary permits shall be submitted to and acknowledged by the Town prior to starting any work for which a permit is required.

1.3 ENVIRONMENTAL REQUIREMENTS

- A. The Contractor shall be responsible for preparing and submitting the Connecticut DEEP General Discharge Permit, if required, and for ensuring that all information contained within the permit is accurate and complete, including certification by a Professional Engineer. The Contractor shall be accountable for paying any registration fee to the Connecticut DEEP for the "General Permit Registration Form for the Discharge of Groundwater.

PART 2 - PRODUCTS

NOT USED

WWTF HEADWORKS IMPROVMENTS
MONTVILLE WPCA

REGULATORY REQUIREMENTS
CONTRACT 2021-5

PART 3 - EXECUTION

NOT USED

END OF SECTION

SECTION 01090
REFERENCE STANDARDS

PART 1 - GENERAL

1.1 CODES AND STANDARDS.

- A. Any material, method, or procedure specified by reference to the number, symbol, or title of a specific code, specification, or standard, such as a Commercial Standard, American National Standard, Federal or State Specification, Industry or Government Code, or a trade association code or standard, shall, unless a particular issue is designated, comply with the requirements in the latest revision thereof and any amendments or supplements thereto in effect on the date of these contract documents, as indicated on the cover, except as limited to type, class, or grade or modified in such reference.
- B. The code, specification, or standard referred to, except as modified in these Specifications, shall have full force and effect as though printed in these Specifications. These codes, specifications and standards are not furnished to the Contractor since contractors, manufacturers and trades involved are assumed to be familiar with their requirements. The Town will furnish, upon request, information as to how copies of the codes, specifications, and standards referred to may be obtained.

1.2 TOWN OF MONTVILLE STANDARDS.

- A. The Town has developed the following standards and specifications. Unless specified or shown otherwise in the Specifications and on the Drawings of the Contract Documents, all materials and installation details shall conform to the requirements of the latest edition of the manuals.
 - 1. Standard General Conditions and Standard Specifications for Construction of Sanitary Sewers and Related Structures; September 2009.

1.3 OTHER REFERENCE STANDARDS.

- A. The following codes, specifications or standards listed hereinafter, shall have full force and effect as though printed in these specifications, except as modified for this Contract.
 - 1. Connecticut DOT: Connecticut Department of Transportation's "Standard Specifications for Roads, Bridges and Incidental Construction, Form 817." and amendments thereto.
 - 2. ACI: American Concrete Institute
 - 3. ANSI/AWWA: American National Standards Institute and American Water Works Association.
 - 4. ASTM: American Society of Testing Materials.
 - 5. AASHTO: American Association of State Highway and Transportation Officials.
 - 6. CGSESC: Connecticut Guidelines for Soil Erosion and Sediment Control
 - 7. CSSWC: Connecticut Council on Soil and Water Conservation
 - 8. NFPA: National Fire Protection Association

9. Others: Local town rules, regulations, technical specifications and construction details regulating the proposed work.

1.4 QUALITY ASSURANCE

- A. For products or workmanship specified by association, trade, or Federal Standards, the Contractor shall comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Conform to reference standard by date of issue current on date of Contract Documents.
- C. Obtain copies of standards when required by Contract Documents.
- D. Maintain copy at job site during submittals, planning, and progress of the specific work until Substantial Completion.
- E. Should specified reference standards conflict with Contract Documents, request clarification from Engineer before proceeding with the task.
- F. The contractual relationship of the parties to the Contract shall not be altered from the Contract Documents by mention of inference otherwise in any reference document.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

SECTION 01110

ENVIRONMENTAL PROTECTION

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. The work covered by this Section consists of furnishing all labor, materials and equipment and performing all work required for the prevention of environmental pollution in conformance with applicable laws and regulations, during and as the result of construction operations under this Contract. For the purpose of this Specification, environmental pollution is defined as the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human life; or degrade the utility of the environment for aesthetic and recreational purposes.
- B. The control of environmental pollution requires consideration of air, water and land, and involves management of noise and solid waste, as well as other pollutants.
- C. Schedule and conduct work in a manner that will minimize the erosion of soils in the area of the work. Provide erosion control measures such as diversion channels, sedimentation or filtration systems, berms, staked hay bales, and seeding, mulching or other special surface treatments as are required to prevent silting and muddying of streams, rivers, impoundments, etc. All erosion control measures shall be in place in an area prior to any construction activity in that area.
- D. These Specifications are intended to ensure that construction is achieved with a minimum of disturbance to the existing ecological balance between a water resource and its surroundings.
- E. Compensation for compliance with the requirements of this Section shall be included under the payment items for the various types of work affected by the provisions contained herein. No separate payment will be made for costs associated with environmental protection.

1.2 APPLICABLE REGULATIONS

- A. Comply with all applicable Federal, State and local laws and regulations concerning environmental pollutant control and abatement.
- B. Secure all applicable construction related permits not already secured by the Engineer.
- C. The Contractor shall be responsible for identifying all required permits for the work covered under this Contract.

1.3 IMPLEMENTATION

- A. Prior to commencement of the work meet with the Engineer to develop mutual understanding relative to compliance with these provisions and administration of the environmental pollution control program. Furnish to the Engineer detailed plans, specifications, calculations, and other

information as may be required to clearly show Contractor's proposed methods for meeting the requirements of these Specifications.

- B. Remove temporary environmental control features as needed and incorporate permanent control features into the project at the earliest practicable time.
- C. Compliance with the provisions of this Section by subcontractors shall be the responsibility of the Contractor.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Concrete shall be as specified in Section 03300.

PART 3 - EXECUTION

3.1 EROSION CONTROL

- A. Provide positive means of erosion control such as shallow ditches around construction to carry off surface water. Water shall be diverted to downstream channel ahead of siltation barriers. Flow of surface water into excavated areas shall be prevented. Ditches around construction area shall also be used to carry away water resulting from dewatering of excavated areas. At the completion of the work, ditches shall be backfilled and the ground surface restored to original condition.
- B. Sufficient precautions shall be taken during construction to minimize the run-off of polluting substances such as silt, clay, fuels, oils, bitumens, calcium chloride, or other polluting materials harmful to humans, fish, or other life, into the supplies and surface waters of the State. Control measures must be to assure that turbidity in the receiving water will not be increased more than 10 s.t.u., or as otherwise required by the State or other controlling body, in waters used for public water supply or fish unless limits have been established for the particular water. In surface water used for other purposes, the turbidity must not exceed 25 s.t.u. Special precautions shall be taken in the use of construction equipment to prevent operations which promote erosion. In cross country areas when excavating in wetlands or river flood plain, the excavated material shall be placed on the uphill side of the trench so that the trench serves as a barrier between the excavated material and the wetland or flood plain.

3.2 PROTECTION OF STREAMS

- A. Care should be taken to prevent, or reduce to a minimum, any damage to any stream from pollution by debris, sediment or other material, or from the manipulation of equipment and/or materials in or near such streams. Water that has been used for washing or processing, or that contains oils or sediments that will reduce the quality of the water in the stream shall not be directly returned to the stream. Such waters will be diverted through a settling basin, filter, or other treatment process as may be appropriate and as directed by the Engineer before being directed into the streams.

- B. Do not discharge water from dewatering operations directly into any live or intermittent stream, channel, wetlands, surface water or any storm sewer. Water from dewatering operations shall be treated by filtration, settling basins, or other approved method to reduce the amount of sediment contained in the water to allowable levels.
- C. All preventative measures shall be taken to avoid spillage of petroleum products and other pollutants. In the event of any spillage, prompt remedial action should be taken in accordance with an approved contingency action plan.

3.3 PROTECTION OF LAND RESOURCES

- A. It is intended that the land resources within the project boundaries and outside the limits of permanent work performed under this Contract be preserved in their present condition or be restored to a condition after completion of construction that will appear to be natural and not detract from the appearance of the project. Insofar as possible, confine construction activities to areas shown on the Drawings.
- B. Except within areas bounded by construction easement lines as shown on the Drawings, do not deface, injure, or destroy trees or shrubs, nor remove or cut them without special authority. No ropes, cables, or guys shall be fastened to or attached to any existing nearby trees for anchorage unless specifically authorized by the Engineer. Where such special emergency use is permitted, first adequately wrap the trunk with a sufficient thickness of burlap or rags over which softwood cleats shall be tied before any rope, cable, or wire is placed. Be responsible for any damage resulting from such use.
- C. c. Where trees may possibly be defaced, bruised, injured, or otherwise damaged by the Contractor's equipment or by his/her blasting, dumping or other operations, protect adequately such trees by placing boards, planks, or poles around them. Monuments and markers shall be protected similarly before beginning operations near them.
- D. D The location of the Contractor's storage, and other construction buildings, required temporarily in the performance of the work, shall be upon cleared portions of the job site and shall require written approval of the Engineer. The preservation of the landscape shall be an imperative consideration of buildings. Plans showing storage facilities shall be submitted for review and approval of the Engineer.
- E. Obliterate all signs of temporary construction facilities such as haul roads, work areas, structures, foundations of temporary structures, stockpiles of excess or waste materials, or any other vestiges of construction as directed by the Engineer. Excavation, filling and plowing of roadways will be required to restore the area to near natural conditions which will permit the growth of vegetation thereon. The disturbed areas shall be prepared and seeded as described in Section 02936, or as approved by the Engineer.
- F. All debris and excess material will be disposed of outside wetland or floodplain areas in an environmentally sound manner.

3.4 PROTECTION OF AIR RESOURCES

- A. The use of burning at the project site for the disposal of refuse and debris will not be permitted.

- B. Maintain all excavations, embankments, stockpiles, access roads, plant sites, waste areas, borrow areas, and all other work areas within or outside the project boundaries free from dust which would cause a hazard or nuisance to others.
- C. Approved temporary methods of stabilization consisting of sprinkling, chemical treatment, light bituminous treatment or similar methods will be permitted to control dust.
- D. Sprinkling, to be approved, must be repeated at such intervals as to keep all parts of the disturbed area at least damp at all times, and have sufficient competent equipment on the job to accomplish this if sprinkling is used. Dust control shall be performed as the work proceeds and whenever a dust nuisance or hazard occurs.
- E. Maintain equipment, including mufflers and air pollution control devices, and keep them all in proper working order.

3.5 NOISE CONTROL

- A. Make every effort to minimize noises caused by the construction operations. Equipment shall be equipped with silencers or mufflers designed to operate with the least possible noise in compliance with Federal and State regulations.

3.6 MAINTENANCE OF POLLUTION CONTROL FACILITIES DURING CONSTRUCTION

- A. During the life of this Contract maintain all facilities constructed for pollution control under this Contract as long as the operations creating the particular pollutant are being carried out or until the material concerned has become stabilized to the extent that pollution is no longer being created.

3.7 PROTECTION OF WETLANDS

- A. The following specifications shall apply within the wetland limits shown on the Drawings, as well as any additional area determined by the Engineer.
- B. Material excavation from the trench shall be stockpiled on the upland side of the trench.
- C. Wetland topsoil shall be separated from remainder of excavated material and used in the restoration of the surface of the trench. The surface shall be restored to pre-construction elevation. No mound shall be created, nor shall fill be placed on the surface.
- D. No loaming, seeding, or turf establishment will be permitted in wetland areas unless there is a shortage of stockpiled wetland topsoil.
- E. Construction of permanent access roads in wetland areas is prohibited.
- F. Storage of equipment, construction material, or excavation material in wetland areas is prohibited except as required for completion of work within wetlands.

- G. The CONTRACTOR shall develop and submit to the ENGINEER a Water Quality Protection Plan. CONTRACTOR shall be responsible for minimizing the impact of construction activities on the inland wetlands and open water courses, as designated on the contract drawings.
- H. CONTRACTOR shall bring only those materials necessary to complete the work. Quantities will be limited to those necessary for the day's activities.
- I. Equipment fueling shall be performed away from the inland wetlands and open water courses in suitable areas as approved by the ENGINEER.
- J. Spare fuel, oil, etc., shall be stored in approved containers with secondary containment in suitable areas as approved by the ENGINEER.
- K. Lubrication, grease and oil for equipment that will come in contact with the inland wetlands and open water courses shall be biodegradable and safe for the environment.

3.8 TREE AND PLANT PROTECTION

- A. CONTRACTOR shall protect existing trees, shrubs and plants on or adjacent to the site that are shown or designated to remain in place against unnecessary cutting, breaking or skinning of trunk, branches, bark or roots.
- B. Materials or equipment shall not be stored or parked within the drip line.
- C. Temporary fences or barricades shall be installed to protect trees and plants in areas subject to traffic.
- D. Fires shall not be permitted under or adjacent to trees and plants.
- E. Within the limits of the Work, water trees and plants that are to remain, in order to maintain their health during construction operations.
- F. Cover all exposed roots with burlap that shall be kept continuously wet. Cover all exposed roots with earth as soon as possible. Protect root systems from mechanical damage and damage by erosion, flooding, run-off or noxious materials in solution.
- G. If branches or trunks are damaged, prune branches immediately and protect the cut or damaged areas with emulsified asphalt compounded specifically for horticultural use in a manner approved by the ENGINEER.
- H. All damaged trees and plants that die or suffer permanent injury shall be removed when ordered by the ENGINEER and replaced by a specimen of equal or better quality.

3.9 POLLUTION CONTROL

- A. Provide methods, means and facilities required to prevent contamination of soil, water or atmosphere by the discharge of noxious substances from construction operations.
- B. Provide equipment and personnel, perform emergency measures required to contain any spillages, and to remove contaminated soils or liquids.

1. Excavate and dispose of any contaminated earth offsite and replace with suitable compacted fill and topsoil.
- C. Care shall be taken to prevent, or reduce to a minimum, damage to any water resource from pollution by debris, sediment or other material, or from the manipulation of equipment and/or materials in or near such waters. Water that has been used for washing or processing, or that contains oils or sediments that will reduce water quality shall be diverted through a settling basin or filter before being discharged.
- D. No materials shall be dispersed or stockpiled in any wetland area. No excavated materials or materials to be used in backfilling shall be deposited within 100 feet of any watercourse, wetland area, or drainage facility without prior approval from the ENGINEER and regulatory agencies.
- E. The storage of fuel oil and refueling of equipment shall be restricted to designated areas approved by the ENGINEER and appropriate regulatory agencies.
- F. CONTRACTOR shall not locate his storage of equipment and materials within 100 feet of wetland boundaries or floodplains.
- G. All debris and excess material will be disposed of outside the boundaries of wetland or floodplain areas in an environmentally sound manner as determined by the federal, state, and local regulations.
- H. Take special measures to prevent harmful substances from entering public waters.
 1. Prevent disposal of wastes, effluents, chemicals, or other such substances adjacent to streams, or in sanitary or storm sewers.
- I. Provide systems for control of atmospheric pollutants.
 1. Prevent toxic concentrations of chemicals.
 2. Prevent harmful dispersal of pollutants into the atmosphere.
- J. All CONTRACTOR'S equipment used during construction shall conform to all current federal, state and local laws and regulations.

3.10 SIGNIFICANTLY IMPORTANT ARCHAEOLOGICAL AREAS

- A. For the Contractor's information, the Engineer has no information suggesting that the Project sites are of archaeological significance. However, Connecticut CWF guidelines require text relating to archaeology to be included in CWF-funded project documents.
- B. Should the Contractor or Engineer discover evidence of remains or other items of archaeological significance, Contractor shall report these findings to the local police department and shall exercise the utmost care to ensure that these areas remain undisturbed. Contractor shall allow recovery of such finds by the authorities, shall not remove such artifacts under penalty of law, and shall prevent construction or private vehicles from crossing over these areas. In addition, when directed by the Engineer, cover these areas with 1-ft common fill to the limits directed by the Engineer.

END OF SECTION

SECTION 01152

APPLICATIONS FOR PAYMENT

PART 1 - GENERAL

1.1 REQUIREMENTS INCLUDED

- A. Submit Applications for Payment to the Engineer in accordance with the schedule established by Conditions of the Contract and Agreement Between Town and Contractor.
- B. The accepted Schedule of Values, Section 01370, shall be used as the basis for the Contractor's Application for Payment.

1.2 RELATED WORK

- A. Schedule of Values is included in Section 01370.
- B. Contract Closeout is included in Section 01700.

1.3 SUBMITTALS

- A. Submit to the Engineer, in accordance with Section 01300, applications typed on forms provided by the Town, Application for Payment, with itemized data typed on 8-1/2-in by 11-in or 8-1/2-in by 14-in white paper continuation sheets.
- B. Provide itemized data on continuation sheet.
 - 1. Format, schedules, line items and values: Those of the Schedule of Values accepted by the Engineer.
- C. Provide construction photographs.

1.4 PREPARATION OF APPLICATION FOR EACH PROGRESS PAYMENT

- A. Application Form
 - 1. Fill in required information, including that for Change Orders executed prior to date of submittal of application.
 - 2. Fill in summary of dollar values to agree with respective totals indicated on continuation sheets.
 - 3. Execute certification with signature of a responsible officer of Contract firm.
- B. Continuation Sheets
 - 1. Fill in total list of all scheduled component items of Work, with item number and scheduled dollar value for each item.

2. Fill dollar value each in each column for each scheduled line item when work has been performed or products stored.
 - a. Round off values to nearest dollar, or as specified for Schedule of Values
3. List each Change Order executed prior to date of submission, at the end of the continuation sheets.
 - a. List by Change Order Number and description, as for an original component item of work.

1.5 SUBSTANTIATING DATA FOR PROGRESS PAYMENTS

- A. When the Town or the Engineer requires substantiating data, submit suitable information, with a cover letter identifying.
 1. Project.
 2. Application number and date.
 3. Detailed list of enclosures.
 4. For stored products:
 - a. Item number and identification as shown on application.
 - b. Description of specific material.
- B. Submit one copy of data and cover letter for each copy of application.
- C. As a prerequisite for payment, submit a "Surety Acknowledgment of Payment Request" letter showing amount of progress payment which the Contractor is requesting.
- D. Maintain an updated set of drawings to be used as record drawings. As a prerequisite for monthly progress payments, exhibit the updated record drawings for review by the Town and the Engineer.

1.6 PREPARATION OF APPLICATION FOR FINAL PAYMENT

- A. Fill in Application form as specified for progress payments.
- B. Use continuation sheet for presenting the final statement of accounting as specified in Section 01700- Contract Closeout.

1.7 SUBMITTAL PROCEDURE

- A. Submit Applications for Payment to the Engineer at the times stipulated in the Agreement.
- B. Number: Five (5) copies of each Application.
- C. When the Engineer finds Application properly completed and correct, he/she will transmit certificate for payment to Town, with copy to Contractor.

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APPLICATIONS FOR PAYMENT
CONTRACT 2021-5

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01200
PROJECT MEETINGS

PART 1 - GENERAL

1.1 PRECONSTRUCTION CONFERENCE

- A. A preconstruction conference as specified in Section 01210 will be held between the Contractor, the Engineer and the Town to review the Contractor's proposed methods of complying with the requirements of the Contract Documents.
- B. Contractor will be notified of the time, date and place where the preconstruction conference will be held. The Engineer will prepare the agenda. The Contractor will provide the data required and be prepared to contribute to all discussion of agenda items.

1.2 COORDINATION MEETINGS

- A. Hold project coordination meetings (monthly or more frequently, if needed). The meeting shall be scheduled and chaired by the Contractor's Project Manager if any; otherwise, by the Contractor's Resident Superintendent. The Chairman is hereby assigned the duty and given the authority to request representation (at each meeting) by every entity currently involved in coordination or planning of coordination for the work; including invitations to the Town, Engineer, separate contractors, subcontractors, governing authorities, insurers and similar responsible entities having an interest or expertise in the coordination. Conduct meetings in a manner which will resolve coordination problems. Record results of meetings and distribute copies to everyone in attendance, the Engineer and to others affected by the decisions or actions resulting from each meeting.

1.3 PROGRESS MEETINGS

- A. The Engineer shall schedule and administer progress meetings, as required and specially called meetings throughout the progress of the work. The Engineer and the Engineer's agents shall attend said meetings to ascertain that all Work is expedited consistent with the Contract Documents and construction schedules. Require every entity then involved in the planning, coordination or performance of work to be properly represented at each meeting. Include (when applicable) the Town, Engineer, consultants, separate contractors (if any), principal subcontractors, suppliers/manufacturers/fabricators, governing authorities, insurers, special supervisory personnel and others with an interest or expertise in the progress of the work. Review each entity's present and future needs including interface requirements, time, sequence, deliveries, access, site utilization, temporary facilities and services, hours of work, hazards and risks, housekeeping, change orders and documentation of information for payment requests. Discuss whether each element of current work is ahead of schedule, on time, or behind time in relation with the updated progress schedule. Determine how behind-time work will be expedited and secure commitments from the entities involved in doing so. Discuss whether schedule revisions are required to ensure that current work and subsequent work will be completed within the Contract Time. Review everything of significance which could affect the progress of the work.

- B. The time and location of such meetings shall be designated by the Engineer and shall be convenient for all parties involved
- C. The meetings shall be scheduled and administered throughout progress of the Work at minimum monthly intervals.
- D. The Contractor must attend all periodic progress and specially called meetings throughout the progress of the work.
- E. Representatives of the Contractor, subcontractors, and major suppliers attending said meetings shall be qualified and authorized to act on behalf of the entity each represents.
- F. Within 3 days after each progress meeting date, distribute copies of the minutes-of-the- meeting to each entity present and to others who should have been present. Prepare and include in distribution and have available for other distribution including copies with payment request, brief summary (in narrative form) of the progress of the work since previous meeting and report.
- G. Immediately following each progress meeting where revisions to the Progress Schedule/ Critical Path Schedule have been made or recognized (regardless of whether agreed to by each entity represented), revise the Schedule. Reissue revised Schedule concurrently with report of each meeting, unless extensive revisions require a longer revision period, but in any case, reissue within ten (10) days after meeting. At intervals matching the preparation of payment requests, revise and reissue the Schedule to show actual progress of the work in relation to the latest revision of the Schedule.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01210

PRE-CONSTRUCTION CONFERENCE

PART 1 - GENERAL

1.1 GENERAL

- A. Date, Time, and Location: Conference will be held after execution of the Contract and before construction is started at the site. The Town will fix the date, time and location of the meeting.
- B. Engineer shall prepare agenda, preside at meetings, prepare and distribute a transcript of proceedings to all parties.
- C. Contractor shall provide data required, contribute appropriate items for discussion, and be prepared to discuss all items on agenda.

1.2 REQUIRED ATTENDANCE

- A. Contractor and major Subcontractors.
- B. Town's representative.
- C. Engineer.

1.3 AGENDA

- A. Agenda will include, but will not necessarily be limited to, the following:
 - 1. Designation of responsible personnel.
 - 2. Subcontractors.
 - 3. Coordination with other contractors.
 - 4. Construction schedule.
 - 5. Processing of Shop Drawings and distribution of Submittals.
 - 6. Processing of field decisions and Change Orders.
 - 7. Requirements for copies of Contract Documents.
 - 8. Insurance in force.
 - 9. Schedule of Values.
 - 10. Processing and Schedule of Payments.
 - 11. Use of premises.
 - 12. Contractor responsibility for safety and first aid procedures.
 - 13. Security
 - 14. Housekeeping.
 - 15. Field Office.
 - 16. As-Built Drawings
 - 17. Any other project related items.
 - 18. Safety standards and procedures.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01300

SUBMITTALS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Submittal procedures.
- B. Proposed Products List.
- C. Shop drawings.
- D. Product data.
- E. Operation and maintenance data
- F. Samples.
- G. Manufacturers' instructions.
- H. Manufacturers' certificates.

1.2 SUBMITTAL PROCEDURES

- A. Cover all submittals with transmittal forms. Sequentially number the transmittal forms. Resubmittals to have original number with an alphabetic suffix.
- B. Identify Project, Contractor, Subcontractor or supplier; pertinent Drawing sheet and detail number(s), and specification Section number, as appropriate.
- C. Apply Contractor's "approved" stamp, signed or initialed certifying that review, verification of Products required, field dimensions, adjacent construction Work, and coordination of information, are in accordance with the requirements of the Work and Contract Documents.
- D. Schedule submittals to expedite the Project and deliver to Engineer. Coordinate submission of related items.
- E. Identify variations from Contract Documents, Product or system limitations which may be detrimental to successful performance of the completed Work shall be identified also.
- F. Provide space for Contractor and Engineer review stamps.
- G. Revise and resubmit submittals as required, identify all made since previous submittal.
- H. Distribute of reviewed submittals to concerned parties. Instruct parties to promptly report any inability to comply with provisions.

I. Review Time

1. Allow sufficient time so that Work will not be delayed as a result of time required to properly process submittals, including time for resubmittal if necessary. The Engineer shall attempt to return correctly formatted submittals within three weeks of receipt.
2. No extension of time will be authorized because of the Contractor's failure to transmit submittals sufficiently in advance of the Work.
3. No extension of time will be authorized because of submittals which are not submitted in accordance with the Contract Documents or are not sufficiently complete for review.

J. Engineer's Review

1. Limited to two per required submittal item.
2. Relative to requirements of this paragraph, receipt by the Engineer of a submission from the Contractor constitutes a review.
3. Cost of Engineer review of submittal items not required (unless specifically arranged by Engineer in advance), costs of review of submittals for requests for substitution made after bidding (unless product becomes unavailable through no fault of the Contractor), and costs for third and subsequent reviews of required submittal items shall be paid by the Contractor and shall be withheld from Owner's payments to Contractor.

1.3 PROPOSED PRODUCTS LIST

- A. Within fifteen (15) days after date of Notice to Proceed, submit complete list of major products proposed for use, with name of manufacturer, trade name and model number for each product.
- B. For products specified only by reference standards give manufacturer, trade name, model or catalog designation, and reference standards.

1.4 SHOP DRAWNGS

- A. Submit the number of copies which the Contractor requires, plus three (3) copies which will be retained by the Engineer. Shop drawings containing electrical, plumbing, HVAC, and/or structural information shall include one (1) additional set.
- B. Submit for approval completely dimensioned shop, layout or setting drawings and catalog cuts or other data as required to provide a complete description of system equipment.
- C. Submit completely dimensioned shop drawings certified for construction by the manufacturer and approved by the Contractor which includes in plan and cross section, location of electrical connections and characteristics; wiring diagrams; utility requirements as to types, sizes and locations; anchor bolt layout; details indicating construction and materials of construction; diameter of shafting; dimensions and horsepower of all motors; gear and bearing ratings; service factors and weights of principal parts and completely assembled equipment.

1.5 PRODUCT DATA

- A. Submit the number of copies which the Contractor requires, plus three (3) copies which will be retained by the Engineer. Product data containing electrical, plumbing, HVAC, and/or structural information shall include one (1) additional set.
- B. Mark each copy to identify applicable products, models, options and other data. Supplement manufacturer's standard data to provide information unique to this Project.
- C. Submit performance data including pump curves; equipment capacities, characteristics and limitations; materials of construction; finishes.

1.6 OPERATION AND MAINTENANCE DATA

- A. Submit two (2) copies of operation and maintenance (O&M) data prepared by the manufacturer/supplier with Shop Drawings and/or Product Data for equipment specified.
- B. Submission and review of O&M data will be considered an integral part of furnishing and installation of equipment.
- C. One copy of the reviewed O&M data will be returned with reviewed Shop Drawings and/or Product Data. Contractor shall make any corrections or additions required and incorporate data into O&M manuals.

1.7 SAMPLES

- A. When determined as appropriate by the Engineer, submit samples to illustrate functional and aesthetic characteristics of the Product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
- B. Submit samples of finishes and patterns for selection.
- C. Include identification on each sample, with full Project Information.
- D. Submit the number of samples specified in individual specification Sections.
- E. Reviewed samples which may be used in the Work are indicated in individual specification Sections.

1.8 MANUFACTURER'S INSTRUCTIONS

- A. When specified in individual specification Sections, submit manufacturer's printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, in quantities specified for Product Data.
- B. Identify conflicts between manufacturer's instructions and Contract Documents.

1.9 MANUFACTURER'S CERTIFICATES

- A. When specified in individual specification Sections, submit manufacturer's certificate to Engineer for review, in quantities specified for Product Data.
- B. Indicate if materials or Products conform to or exceed specified requirements. Submit supporting reference date, affidavits, and certifications as appropriate.
- C. Certificates may be recent or previous test results on material or Product but must be acceptable to engineer.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01310
PROGRESS SCHEDULES

PART 1 - GENERAL

1.1 SCHEDULE OF OPERATIONS

- A. Within twenty (20) business days of the date of the executed Contract, six (6) copies of a written schedule or schedules shall be submitted showing the order and times when the various portions of the work will be commenced and completed and the time or times when the several supplies, services or connecting work, if any, which are to be furnished or performed by others will be needed, all to conform to the requirements to time or times contained in the Contract documents. Sheet size shall be a minimum 24" x 36". The Engineer may require revisions or changes in any schedule in the event it does not comply with the requirements of the Contract documents. The work shall be prosecuted in accord therewith. All work shall be performed or constructed and all materials or supplies furnished not later than the time or times stipulated therefore in the Contract documents.
- B. In general the Contractor may determine order of work if such work does not interfere or conflict with any permits provided by other agencies and such schedules will permit the Contractor to complete the Work within the time identified herein.
- C. The appropriate authorities shall be contacted concerning any public or semi-public events that may occur during the construction period and may affect his construction. The Contractor alone shall be responsible for arranging his construction sequence to conform to any restrictions these events may impose. No claims for extras will be allowed because of any delays, extra pipe handling, extra excavation, etc. caused by the imposed restrictions. However, additional time may be granted for completion of the work to compensate for any delays caused by said restrictions.
- D. The schedule of operations shall be updated as requested by the Engineer, if, in the Engineer's opinion, the work is not progressing as scheduled.

1.2 TIME AND ORDER OF WORKING

- A. In order that the Work may be conducted with a minimum of inconvenience to the Owner or public, and that the work on this Contract may be coordinated with other work which may be under construction or contemplated, and, that Work under the Contract may conform to conditions under which it has been undertaken or conditions attached to the property for this work, the Engineer may determine the point or points and time or times when portions of the Work will be commenced or carried on and may issue orders pertaining thereto and relative to the rate of progress on the several portions of the work.
- B. In the event the Contractor has reason to think there has been a delay or may be delayed by any act or omission of the Town or any of its agents, or by any other cause beyond the control of the Contractor and that could not have been anticipated by the Contractor, the Contractor shall give notice thereof, in writing, to the Engineer as provided elsewhere herein and in the Contract Agreement.

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PROGRESS SCHEDULES
CONTRACT 2021-5

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01370
SCHEDULE OF VALUES

PART 1 - GENERAL

1.1 REQUIREMENTS INCLUDED

- A. Submit to the Engineer a Schedule of Values allocated to the various portions of the work, within seven (7) days after the effective date of the Agreement.
- B. Upon request of the Engineer, support the values with data which will substantiate their correctness.
- C. The accepted Schedule of Values shall be used only as the basis for the Contractor's Applications for Payment.

1.2 RELATED REQUIREMENTS

- A. Standard General Conditions of the Construction Contract are included in Section 00700.
- B. Application for Payment is included in Section 01152.

1.3 FORM AND CONTENT OF SCHEDULE OF VALUES

- A. Type schedule on an 8-1/2-in by 11-in or 8-1/2-in by 14-in white paper furnished by the Town; Contractor's standard forms and automated printout will be considered for approval by the Engineer upon Contractor's request. Identify schedule with:
 - 1. Title of Project and location.
 - 2. Engineer and Project number.
 - 3. Name and Address of Contractor.
 - 4. Contract designation.
 - 5. Date of submission.
- B. Schedule shall list the installed value of the component parts of the work in sufficient detail to serve as a basis for computing values for progress payments during construction.
- C. Identify each line item with the number and title of the respective Section.
- D. For each major line item list sub-values of major products or operations under the item.
- E. For the various portions of the work:
 - 1. Each item shall include a directly proportional amount of the Contractor's overhead and profit.
 - 2. For items on which progress payments will be requested for stored materials, break down the value into:

- a. The cost of the materials, delivered and unloaded, with taxes paid. Paid invoices are for materials upon request by the Engineer.
 - b. The total installed value.
- F. The sum of all values listed in the schedule shall equal the total Contract Sum.

1.4 SUBSCHEDULE OF UNIT MATERIAL VALUES

- A. Submit a sub-schedule of unit costs and quantities for:
- 1. Products on which progress payments will be requested for stored products.
- B. The form of submittal shall parallel that of the Schedule of Values, with each item identified the same as the line item in the Schedule of Values.
- C. The unit quantity for bulk materials shall include an allowance for normal waste.
- D. The unit values for the materials shall be broken down into:
- 1. Cost of the material, delivered and unloaded at the site, with taxes paid.
 - 2. Copies of invoices for component material shall be included with the payment request in which the material first appears.
 - 3. Paid invoices shall be provided with the second payment request in which the material appears, or no payment shall be allowed and/or may be deleted from the request.
- E. The installed unit value multiplied by the quantity listed shall equal the cost of that item in the
- F. Schedule of Values.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01400
QUALITY CONTROL

PART 1 - GENERAL

1.1 SECTION INCLUDES .

- A. Quality assurance and control of installation.
- B. References.
- C. Field samples.
- D. Inspection and testing laboratory services.
- E. Manufacturers' field services and reports.

1.2 QUALITY ASSURANCE/CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions and workmanship, to Work of specified quality.
- B. Comply fully with manufacturers' instructions, including each step in sequence.
- C. Should manufacturers' instruction conflict with Contract Documents, request clarification from Engineer before proceeding.
- D. Comply with specified standards as a minimum quality for the Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Perform work using persons qualified to produce workmanship of specified quality.
- F. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion or disfigurement.
- G. Requirements of Regulatory Agencies: The construction requirements of State, County or other political subdivision specifications exceeding the requirements of the codes, standards, and approving bodies referenced herein shall be met and complied with.
- H. Both the Underwriters' Laboratories (UL) Listings and Approvals and the National Electrical Manufacturers' Associations (NEMA) stamps or seals shall be evidence where applicable to electrical apparatus forming parts of the process or mechanical equipment.

1.3 REFERENCES

- A. Conform to reference standard by date of issue current on date for bids or date of Owner-Contractor Agreement when there are no bids.
- B. Should specified reference standards conflict with Contract Documents, request clarification from Engineer before proceeding.
- C. The contractual relationship of the parties to the Contract shall not be altered from the Contract Documents by mention or inference otherwise in any referenced document.

1.4 FIELD SANIPLES

- A. Install field samples at the site as required by individual specification Sections for review.
- B. Acceptable samples represent a quality level for the Work
- C. Where field sample is specified in individual Sections to be removed, clear area after field sample has been accepted by Engineer.

1.5 INSPECTION AND TESTING LABORATORY SERVICES

- A. Contractor shall employ services of an independent firm approved by Owner to perform inspection and testing. Contractor shall pay for services of that firm.
- B. The independent firm will perform inspections, tests, and other services specified in individual specification Sections and as required by the Engineer.
- C. Reports will be submitted by the independent firm to the Engineer indicating observations and results of tests and indicating compliance or non-compliance with Contract Documents.
- D. Contractor shall cooperate with independent firm; furnish samples of materials, design mix, equipment, tools, storage and assistance as requested.
 - 1. Contractor shall notify Engineer and independent firm 48 hours prior to expected time for operations requiring services.
 - 2. Contractor shall make arrangements with independent firm and pay for additional samples and tests required for Contractor's use.
- E. Retesting required because of non-conformance to specified requirement shall be performed by the same independent firm on instructions by the Engineer. No additional charge to owner for retesting.

1.6 MANUFACTURERS' FIELD SERVICES AND REPORTS

- A. Submit qualifications of observer to Engineer 14 days in advance of required observations. Observer subject to approval of Engineer.
- B. When in individual specification Sections, require material or Product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and

installation, quality of workmanship, start-up of equipment and return services as applicable, and to initiate instructions when necessary.

- C. Representatives are to report observations and site decisions, or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.
- D. Submit report within 30 days of observation to Engineer for review.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01500
TEMPORARY FACILITIES

PART 1 - GENERAL

1.1 TEMPORARY OFFICES

- A. Temporary offices shall be established on the job site where approved or directed by the Engineer within five (5) calendar days after receipt by Owner of notice to proceed and shall be adequately furnished, and maintained in a clean, orderly condition by the Contractor. The Contractor or an authorized representative shall be present in the field office at all times while work is in progress. Instructions received there from the Engineer shall be considered as delivered to the Contractor. The trailer (office for Owner) shall be a unit that is separate and detached from the Contractor's office and large enough to house the requested furnishings. Maintain temporary facilities and controls in proper and safe condition throughout progress of the work
- B. Provide either a separate building or at least 200 sq.ft. of floor space in Contractor's building for the exclusive use of the Engineer throughout the period of construction. The temporary office shall be weathertight, have a tight floor at least 8-in off the ground and shall be insulated all around with rigid insulation board not less than 2-in thick and suitably ventilated. The office shall have at least three screened windows capable of being opened, a screen door and a solid door provided with cylinder lock and three keys. The office shall be provided with janitor service, heating equipment, electrical wiring, outlets and fixtures suitable to light the tables and desk adequately as directed. Provide separate toilet facilities for the exclusive use of the Engineer.
- C. Provide the following furniture and equipment in the Engineer's office:
1. One plan table, 3-ft by 5-ft and one stool
 2. Desk about 3-ft by 5-ft with desk chair
 3. Three additional chairs
 4. Plan rack, as directed
 5. Shelves, as directed
 6. Four-drawer fire proof filing cabinet with lock
 7. Coat rack and hooks
 8. Desk calculator
 9. Air Conditioner (12,000 BTU).
 10. One conference table (6-ft).
 11. Eight (8) folding chairs.
 12. Two First aid kits suitable for ten (10) people with manual, McMaster-Car 9501T1 or equal, items to be restocked for duration of project.
 13. Dumpy Level and Rod
 14. Printers: One color inkjet all-in-one print/fax/scan with up to 11x17 printing with both Ethernet and Wireless network capabilities. HP OfficeJet Pro 7740 Wideformat or equal with minimum 34 pages per minute black and white/color print speed
 15. Western Digital 320 Gigabyte My Passport Essential Portable USB 2.0 hard drive.
 16. 8 Outlet Surge Protector with 2 USB ports with six foot cord and minimum 1800-joule energy rating. Belkin BV108050-06-BLK or equal.

17. One 12-sheet cross cut, high security, shredder with basket. Fellowes model FEL3231001, or equal.

- D. Supply all fuel for heating and pay all electrical bills. Supply at least two separate phone lines to the Engineer's office, including at least one (1) designated phone line, one designated fax line, and internet service.
- E. An approved, suitably constructed and equipped trailer of proper size may be furnished for the Engineer's office.

1.2 TEMPORARY TELEPHONE, FAX MACHINE AND INTERNET SERVICE

- A. Install a private telephone in the Engineer's field office for the Engineer's exclusive use and pay all bills charged against the Engineer's telephone, including installation charge and all monthly and long-distance charges throughout the construction period.
- B. Provide the telephone with an automatic telephone answering device to record messages when the office is not manned. Install a private fax machine in the Engineer's field office for the Engineer's exclusive use and pay any and all charges and expenses associated with the operation of this machine.

1.3 TEMPORARY LIGHT AND POWER

- A. Furnish temporary light and power, complete with wiring, lamps and similar equipment as required to adequately light all work areas and with sufficient power capacity to meet the reasonable needs of all subcontractors. Make all necessary arrangements with the local electric company for temporary electric service and pay all expenses in connection therewith.
- B. Provide connections to existing facilities sized to provide service required for power and lighting. District will pay the costs of power used.
- C. Install circuit and branch wiring with area distribution boxes located so that power and lighting is available throughout the site by use of construction type power cords.
- D. Provide properly configured NEMA polarized outlets to prevent insertion of 1 10-120 Volt plugs into higher voltage outlets. For connection of power tools and equipment, provide outlets equipped with ground-fault circuit interrupters, reset button and pilot light.
- E. Provide grounded extension cords. Use "hard-service" cords where exposed to abrasion and traffic. Provide waterproof connectors to connect separate lengths of electric cords if more than one length is required.
- F. Provide general service incandescent lamps as required for adequate illumination. Provide guard cages or tempered glass enclosures where exposed to breakage. Provide exterior fixtures where exposed to moisture.

1.4 TEMPORARY HEAT

- A. Provide all heat as may be necessary for thawing out and heating the ground or materials and for proper execution, protection and drying out the of work.

1.5 WEATHER PROTECTION

- A. Furnish, install and maintain temporary heat and enclosures to provide adequate working areas for personnel during the months of November through March.
- B. Furnish temporary heating units shall have been tested and labeled by UL, FM, or other recognized association related to the type of fuel being used and maintain reasonable temperatures within the temporary enclosures.

1.6 TEMPORARY SANITARY FACILITIES

- A. Provide self-contained, single-occupant toilet units of the chemical, aerated recirculation, or combustion type, properly vented and fully enclosed in a fiberglass or other approved non-absorbent shell.

1.7 TEMPORARY PARKING FOR OWNER/ENGINEER

- A. Parking facilities required by the Contractor, and his/her subcontractors, shall be at the designated construction staging/trailer area Immediately adjacent to the Contractor's trailer. The Contractor shall provide a minimum of four (4) dedicated parking spaces for the Owner's use, or other representatives of the Owner.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01510

MAINTENANCE OF FLOW IN EXISTING SEWERS

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. The Contractor shall be responsible for maintaining wastewater flow during construction. All bypass pumping systems shall be manned by the Contractor during non-working hours, 7 days per week.
- B. Provide all labor, equipment, power and materials necessary to maintain flow and handle existing wastewater flows. Construct and maintain all temporary bypass sewers and be responsible for all by-pass pumping of sewage that may be required to prevent backing up of sewage during installation of all new pipe and structures and to allow proper inspection and testing of the new Work. The Contractor shall immediately remove and dispose of all offensive matter spilled during the by-pass pumping at his own expense.
- C. When by-pass pumping is required the Contractor shall supply pumps, conduits, power, and other equipment to divert the flow of sewage around the section in which work is to be performed. The by-pass system shall be, as a minimum, greater than the pipe capacity. A secondary pump is required to be on hand and within distance of by-pass site so as to maintain flow within the collection system at all times should the primary pump fail.
- D. The Contractor shall be required to repair at his own expense any damage to property, public or private, caused by his operations.
- E. Wastewater flows from existing sewers shall not be allowed to enter the new facilities until the new facilities have been cleaned and tested as required in the Specifications.
- F. Should damage of any kind occur to the existing piping, the Contractor shall at his own expense make repairs to the satisfaction of the Engineer.
- G. The Contractor shall not be permitted to overflow, bypass, pump or by any other means convey sewage or drainage to any brook or water course without permission of the Engineer.
- H. All procedures for maintaining flows must meet the approval of the Engineer and the Contractor shall be required to submit to the Engineer, for approval, a detailed written plan of all methods of flow maintenance ten (10) days in advance of flow interruption.
 - 1. Refer to Section 01046 for noise limitations.

WWTF HEADWORKS IMPROVMENTS
MONTIVILLE WPCA

MAINTENANCE OF FLOW IN EXISTING SEWERS
CONTRACT 2021-5

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01570

TRAFFIC REGULATIONS AND CONTROL

PART 1 - GENERAL

1.1 SUMMARY

- A. The Contractor will be responsible for the establishment and maintenance of overall traffic patterns in and around the project site(s) as directed by the Engineer or as shown on the Drawings.
- B. The Contractor shall be solely responsible for protection of vehicles and pedestrians within the immediate vicinity of the construction operations.
- C. Contractor shall provide, implement, erect, construct, maintain, adjust, and remove all the necessary or required barricades, signs and signals, and the like, and shall take all the necessary measures or precautions for the maintenance and protection of vehicular and pedestrian traffic in the immediate area of the work.
- D. Contractor shall also meet with and coordinate the project-wide traffic control system with the Engineer.
- E. The Contractor shall also restore traffic control facilities, where such items and facilities are disturbed by their work under this Contract.

1.2 RELATED SECTIONS:

- A. Scope and Sequence of Work is included in Section 01014.
- B. Coordination is included in Section 01040.

1.3 REFERENCES

- A. State of Connecticut, Department of Transportation Standard Specifications for Roads, Bridges, and Incidental Construction, Form 818, including all additions and revisions.
- B. Town of Montville Standard Specifications, latest revision.

PART 2 - PRODUCTS

2.1 PRODUCTS AND MATERIALS

- A. All products and material furnished and incorporated into the work under this Section of the Specifications shall conform to the requirements and specifications as may be found in the following reference manuals:

1. The Connecticut Department of Transportation's "Standard Specifications for Roads, Bridges and Incidental Construction, Form 818", 2020, and amendments thereto.
2. Traffic Control Devices — Traffic Control devices in general, shall conform to the latest revision of the U.S. Department of Transportation, Federal Highway/Administration's "Manual of Uniform Traffic Control Devices for Streets and Highways", unless otherwise specified by these Specifications and Drawings.

PART 3 - EXECUTION

3.1 GENERAL

- A. The Contractor shall be responsible for and shall make all the necessary arrangements for the maintenance and protection of traffic within their immediate work area(s).

END OF SECTION

SECTION 01610
MATERIALS AND EQUIPMENT

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Products.
- B. Transportation and handling.
- C. Storage and protection.
- D. Scheduling and coordination.
- E. Product options.
- F. Substitutions.
- G. Installation requirements.
- H. Equipment demonstration.
- I. Manufacturer's Representative.

1.2 PRODUCTS

- A. Products: Means new material, machinery, components, equipment, fixtures, and systems forming the Work. This does not include machinery and equipment used for preparation, fabrication, conveying and erection of the Work. Products may also include existing materials or components required for reuse.
- B. Do not use materials and equipment removed from existing premises, except as specifically permitted by the Contract Documents.
- C. Provide interchangeable components of the same manufacturer for similar components.

1.3 TRANSPORTATION AND HANDLING

- A. Transport and handle products in accordance with supplier's or manufacturer's written instructions.
- B. Promptly inspect shipments to assure that products comply with requirements, quantities are correct, and products are undamaged.

- C. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.
- D. When unloading materials, equipment, and machinery, provide special lifting harness or apparatus as may be required by manufacturers.

1.4 STORAGE AND PROTECTION

- A. Store and protect products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive products in weather-tight, climate-controlled enclosures.
- B. For exterior storage of fabricated products, place on sloped supports, above ground.
- C. Provide off-site storage and protection when site does not permit on-site storage or protection.
- D. Cover products subject to deterioration with appropriate covering to prevent damage.
- E. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
- F. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- G. Arrange storage of products to permit access for inspection. Periodically inspect to assure products are undamaged and are maintained under specified conditions.

1.5 SCHEDULING AND COORDINATION

- A. Coordinate the delivery and installation of equipment with the Work of other sections.
- B. Electrical Interface: Install or mount, as work of this Contract, those electrical components or apparatus as required for the equipment specified in this Contract.
- C. Start-up and testing: Coordinate start-up and testing with work of other sections and ensure that required utilities and water supply are available.

1.6 PRODUCT OPTIONS

- A. Products specified by reference standards or by description only: Any product meeting those standards or description.
- B. Products specified by naming one or more manufacturers: Products of 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.

1.7 SUBSTITUTIONS

- A. See Section 01630: Substitutions and Product Options.

1.8 INSTALLATION REQUIREMENTS

- A. The Contractor shall check all dimensions indicated immediately after award of the Contract. Advise the Engineer promptly of any discrepancies or interferences and obtain such measurements and information as may be required to satisfactorily install the work.
- B. Before ordering any material or doing any work, the Contractor shall verify all measurements and elevations and shall be responsible for the correctness of same. Any difference, which may be found, between field measurements and elevations and those indicated shall be promptly submitted to the Engineer for adjustment and approval before proceeding with the work.
- C. Verify that site conditions are ready to receive the Work.
- D. The Contractor shall lay out work and establish heights and grades in strict accordance with the Drawings, the building and finished site grades, and shall be responsible for the accuracy of such layout.
- E. Verify that required utilities are available and of the correct characteristics.
- F. Align, level and adjust equipment for satisfactory operation: install so that connecting and disconnecting of piping and accessories can be done readily, and so that all parts are easily accessible for inspection, operation and maintenance.
- G. Material and equipment shall be installed in accordance with manufacturers' written instructions and recommendations.
- H. Furnish and apply any initial grease or oil recommended by manufacturer before start-up.
- I. Manufacturer's representative shall review equipment installation and provide written certification that equipment and its installation meet manufacturer's recommendations and comply with the Specifications.
- J. Contractor shall coordinate installation of equipment.
- K. In the event that installation requirements need clarification as to Contract responsibility, Engineer shall be final judge in delineation of responsibility. In no case shall need for clarification result in extension of Contract Time or change in Contract Price.

1.9 EQUIPMENT AND APPURTENANCE DEMONSTRATION

- A. Contractor shall furnish all labor, tools, materials, equipment and water for all demonstration tests.
- B. Operation of equipment or appurtenance during all phases of demonstration prior to Final Acceptance by Owner and Engineer is the Contractor's complete responsibility.

- C. Notify Engineer and Owner seven days in advance of each test or demonstration.
- D. Initial equipment start-up: After manufacturer's representative has reviewed the installation of his equipment and found it acceptable, he shall place equipment in operation. He shall perform all tests necessary to ensure each item of equipment operates in accordance with the design intent and Specifications. At a minimum the following tests are required:
 - 1. Starting current
 - 2. Running current
 - 3. Pumped flow rate at several different dynamic head conditions (for pumps)
 - 4. Control system function test
 - 5. Demonstration of accuracy of flow meters and gauges
- E. Correction of deficiencies - All performance deficiencies, leaks, misalignments found during start-up shall be corrected at Contractor's expense. Correction may include replacement of defective equipment or appurtenance if Engineer so recommends. Correction must be performed and accepted by Engineer prior to demonstrations.
- F. Initial Performance Test: When equipment or appurtenance has been started and tested by manufacturer's representative, all deficiencies have been corrected, and equipment operates as specified, Contractor shall demonstrate tests described in 1.09 D. above and other appropriate function tests to the Engineer and Owner.
- G. System Performance Demonstration: When individual items of equipment which are part of a system have been shown to operate satisfactorily to Owner and Engineer, Contractor shall operate all equipment or appurtenance together as a system. Contractor shall test all performance functions, all alternate and emergency operating procedures and all alarm conditions using actual or simulated conditions. Contractor shall coordinate demonstration to ensure all required manufacturer's representatives and subcontractors are present. Each manufacturer's representative shall ensure that his equipment is performing as intended. All deficiencies shall be corrected at Contractor's expense.
- H. Contractor shall propose demonstration procedure in writing three days in advance for Engineer's review. Demonstration shall include all performance functions both for individual equipment components and entire system, all alarm conditions and all alternate and emergency operating procedures. All portions of system shall be operating simultaneously. All equipment must be permanently installed with permanent utility supplies and connections before demonstration may be scheduled. Demonstration shall continue until a minimum of two hours has accumulated when entire system is operating according to design intent and as specified.
- I. Successful Demonstration: When all constructed components perform individually and as an integrated whole according to the design intent and as specified and all deficiencies have been permanently corrected, System Performance Demonstration shall be considered successful.
- J. Repeat Demonstration: When defects are encountered, repeat Demonstration after corrective actions have been taken. Continue this process until no defects are encountered.
- K. Electrical Contractor shall be present for performance of Initial Mechanical Performance Tests and System Performance Demonstration for each piece of equipment having electrical connections.

1.10 MANUFACTURER'S REPRESENTATIVE

- A. Provide services of a qualified equipment manufacturer's representative under Provisions of Section 01400 to review installation, perform pre-start-up checks, start-up, test, adjust and demonstrate equipment and instruct Owner in operation and maintenance procedures.
- B. Instruction for Owner shall not be scheduled until System Performance Demonstration has been successfully completed.
- C. Instruction for Owner shall include review of start-up, operation and shut down procedures, alternate of operation, anticipated adjustments, maintenance procedures and schedules, troubleshooting methods and manufacturer's operation and maintenance literature. Owner reserves right to videotape instruction sessions.
- D. Manufacturer's Representative shall certify in writing that installation is satisfactory, and that equipment is operating as specified.
- E. Furnish services of Manufacturer's Representative for the minimum period of time indicated in the following table for each item of equipment. Times indicated shall not include travel time. If correction of deficiencies and retesting requires more that the indicated time, Contractor shall extend time at no additional cost to Owner. Time period for instruction of Owner is also indicated. This minimum time for instruction shall be provided irrespective of hours provided for start-up, testing, correction of deficiencies and demonstrations during non-instructive time. Time spent in these other activities will not be considered training hours.
- F. The following is a list of required time allotments

		Min. Non- Instruction Hours	Min. Instruction Hours
1.	Pumps and Controls	12	4
2.	Headworks Equipment	12	8
3.	Electrical Controls and Instrumentation	8	4

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01630

SUBSTITUTIONS AND PRODUCT OPTIONS

PART 1 - GENERAL

1.1 REQUIREMENTS INCLUDED

- A. Furnish and install Products specified, under options and conditions for substitutions stated in this Section.
- B. Whenever a product, material or item of equipment is specified or described by using the name of a proprietary product or the name of a particular manufacturer or vendor, followed by the phrase "or equal," the specific item mentioned shall be the basis upon which bids are to be prepared, and shall be understood as establishing the type, function, dimension, appearance and quality desired. Other manufacturer's or vendor's products not named will be considered as substitutions, provided the required information is submitted in the manner set forth in this section and provided the substitution will not require substantial revision to the Contract Documents.

1.2 RELATED WORK

- A. Section 01600: Delivery Storage and Handling.

1.3 SUBMITTAL OF LIST OF PROPOSED SUBSTITUTIONS

- A. A. Bidders shall submit their list of proposed substitutions and the proposed monetary changes associated therewith to the Town on the standard form provided together with their bids.

1.4 CONTRACTOR'S OPTIONS

- A. For Products specified only by reference standard, select product meeting that standard, by any manufacturer.
- B. For Products specified by naming several products or manufacturers, select any one of products and manufacturers named which complies with Specifications.
- C. For Products specified by naming one or more products or manufacturers and stating "or equal," submit a request as for substitutions, for any product or manufacturer which is not specifically named.
- D. For Products specified by naming only one product and manufacturer, there is no option and no substitution will be allowed.

1.5 SUBSTITUTIONS

- A. In order for substitutions to be considered, the Contractor shall submit, within thirty (30) days of issuance of Notice of Award, complete data as set forth herein to permit complete analysis of all proposed substitutions noted on his substitutions list. No substitution shall be considered unless the Contractor provides the required data in accordance with the requirements of this Section within the thirty (30) day period.
- B. Submit separate request for each substitution. Support each request with:
1. Complete data substantiating compliance of proposed substitution with requirements stated in Contract Documents:
 - a. Product identification, including manufacturer's name and address.
 - b. manufacturer's literature; identify:
 - 1) Product description.
 - 2) Reference standards.
 - 3) Performance and test data.
 - 4) Operation and maintenance data.
 - c. Samples, as applicable.
 - d. Name and address of similar projects on which product has been used, and date of each installation.
 2. Itemized comparison of the proposed substitution with product specified; List significant variations. Substitution shall not change design intent and shall perform equal to that specified.
 3. Data relating to impact on construction schedule occasioned by the proposed substitution.
 4. Any effect of substitution on separate contracts.
 5. List of changes required in other work or products.
 6. Accurate cost data comparing proposed substitution with product specified.
 7. Amount of any net change to Contract Sum.
 8. Designation of required license fees or royalties.
 9. Designation of availability of maintenance services, sources of replacement materials.
- C. Substitutions will not be considered for acceptance when:
1. They are indicated or implied on shop drawings or product data submittals without a formal request from Contractor.
 2. They are requested directly by a subcontractor or supplier.
 3. Acceptance will require substantial revision of Contract Documents.
- D. Requests for substitutions submitted after Notice of Award will not be considered unless evidence is submitted to the Engineer that all of the following circumstances exist:
1. The specified product is unavailable for reasons beyond the control of the Contractor. Such reasons shall consist of strikes, bankruptcy, discontinuance of manufacturer, or acts of God.
 2. The Contractor placed, or attempted to place, orders for the specified products within 10 days after Notice of Award.
 3. Request for substitution is made in writing to the Engineer within 10 days of the date on which the Contractor ascertains that he cannot obtain the item specified.
 4. Complete data as set forth herein to permit complete analysis of the proposed substitution is submitted with the request.

- E. The Engineer's decision regarding evaluation of substitutions shall be considered final and binding. Requests for time extensions and additional costs based on submission of, acceptance of, or rejection of substitutions will not be allowed. All approved substitutions will be incorporated into the Agreement by Change Order.

1.6 CONTRACTOR'S REPRESENTATION

- A. In making formal request for substitution, Contractor represents that:
 - 1. He has investigated proposed product and has determined that it is equal to or superior in all respects to that specified.
 - 2. He will provide same warranties or bonds for substitution as for product specified.
 - 3. He will coordinate installation of accepted substitution into the Work, and will make such changes as may be required for the Work to be complete in all respects.
 - 4. He waives claims for additional costs caused by substitution which may subsequently become apparent.
 - 5. Cost data is complete and includes related costs under his Contract, but not:
 - a. Costs under separate contracts.
 - b. Engineer's costs for redesign or revision of Contract Documents.

1.7 ENGINEER DUTIES

- A. Review Contractor's requests for substitutions with reasonable promptness.
- B. Notify Contractor, in writing, of decision to accept or reject requested substitution.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01700
CONTRACT CLOSEOUT

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. This Section specifies administrative and procedural requirements for project closeout, including but not limited to:
1. Closeout procedures.
 2. Final cleaning.
 3. Adjusting.
 4. Project record documents.
 5. Operation and Maintenance manuals (where applicable)
 6. Warranties
 7. Spare parts and maintenance materials.

1.2 RELATED WORK

- A. Warranties and Bonds are included in Section 01740.

1.3 RECORD DOCUMENTS

- A. Maintain on site, one set of the following documents; actual revisions to the work shall be recorded in these documents:
1. Contract Drawings.
 2. Specifications.
 3. Addenda.
 4. Change Orders and other Modifications to the Contract.
 5. Reviewed shop drawings, product data, and samples.
- B. Store Record Documents separate from documents used for construction.
- C. Record information concurrent with construction progress.
- D. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
1. Manufacturer's name and product model and number.
 2. Product substitutions or alternates utilized.
 3. Changes made by Addenda and Modifications.
- E. Contract Drawings and Shop Drawings: Legibly mark each item to record actual construction including:

1. Measured horizontal and vertical locations of all underground utilities (i.e. manholes, wyes, chimney, connections to existing piping) and appurtenances, referenced to permanent surface improvements. Record horizontal distances between manholes and distances to each service lateral from the downstream manhole.
2. Field changes of dimension and detail.
3. Details not on original Contract Drawings.

F. Submit documents to Engineer with Application for Final Payment.

1.4 CLOSEOUT PROCEDURES

- A. Submit written certification 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 inspection.
- B. Provide submittals to Engineer or Owner that are required by governing or other authorities.
- C. Submit Application for Final Payment identifying total adjusted Contract Sum, previous payments and sum remaining due. Include all specified releases, guarantees, waivers and other documents.

1.5 FINAL CLEANING

- A. Complete the following cleaning operations before requesting inspection for Certification of Substantial Completion.
 1. Remove labels that are not permanent labels.
 2. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication and other substances. Clean light fixtures and lamps.
 3. Clean the site, including landscape development areas, of rubbish, litter and other foreign substances. Sweep paved areas broom clean; remove stains, spills and other foreign deposits. Rake grounds that are neither paved nor planted, to a smooth even-textured surface.

1.6 OPERATION AND MAINTENANCE MANUALS

- A. Manuals shall be bound 8-1/2-in by 11-in text pages in binders with durable covers.
- B. Prepare binder covers with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS", title of project.
- C. Internally subdivide the binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.
- D. Contents: Prepare a Table of Contents.
- E. Directory, listing names, addresses, and telephone numbers of Engineer, Contractor, Subcontractors, and suppliers.

- F. Operation and maintenance instructions. Provide instructions for all equipment and materials utilized in the project arranged by process flow. Identify names, addresses, and telephone numbers of Subcontractors and suppliers. Include the following for each item:
1. Significant design criteria.
 2. Erection or installation instructions.
 3. Start-up procedures.
 4. Recommended and alternative operating procedures.
 5. Schedule of preventative maintenance requirements.
 6. Parts list for each component.
 7. Schedule of recommended spare parts to be stocked, complete with part number, inventory quantity and ordering information.
 8. Detailed maintenance procedures.
 9. Schedule of lubrication requirements.
 10. Corrected and approved control and wiring diagrams.
 11. Data sheet listing pertinent equipment or system information.
 12. Addresses and telephone numbers of the nearest sales and service representatives.
 13. Troubleshooting guide.
- G. Project documents and certificates, including the following:
1. Shop drawings and product data.
 2. Certificates.
 3. Photocopies of warranties.
- H. Submit one copy of completed volumes in final form prior to Contractor's notification that work is Substantially Complete. This copy be returned with Engineer comments. Revise content of documents as required prior to final submittal.
- I. Submit three (3) final sets of volumes, revised, within ten days after Engineer returns comments.

1.7 WARRANTIES

- A. See Section 01740: Warranties and Bonds.
- B. Provide duplicate copies.
- C. Execute and assemble documents from Subcontractors, suppliers, and manufacturers.
- D. Assemble in binder with durable cover.
- E. Submit with Operation and Maintenance Manuals.
- F. Provide starting and ending dates of warranty period.
- G. Contractor is responsible for providing warranties for the respective Work.
1. Contractor shall prepare bound copies.

1.8 SPARE PARTS AND MAINTENANCE MATERIALS

- A. Provide products, spare parts, maintenance and extra materials in quantities specified in individual specification sections.
- B. Deliver and place in location as directed; obtain receipt prior to final payment.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01720
AS-BUILT DOCUMENTS

PART 1 - GENERAL

1.1 GENERAL

- A. In addition to the requirements of the General Conditions, Contractor shall maintain and provide the Engineer with as-built documents as specified below.
- B. Maintenance of Documents:
 - 1. Maintain in Contractor's field office in clean, dry, legible condition complete sets of the following: Contract Drawings, Specifications, Addenda, approved Shop Drawings, Samples, Photographs, Change Orders, other modifications of Contract Documents, Test Records, Field Orders, and all other documents pertinent to Contractor's Work.
 - 2. Provide files and racks for proper storage and easy access. File in accordance with filing format of Construction Specifications Institute (CSI), unless otherwise approved by Engineer.
 - 3. Make documents available at all times for inspection by the Engineer and Town.
 - 4. As-built documents shall not be used for any other purpose and shall not be removed from the Contractor's office without Town approval.
- C. Recording:
 - 1. Keep as-built documents current. Drawings to be updated at a minimum once per week.
 - 2. Do not permanently conceal any Work until required information has been recorded.
 - 3. Contract Drawings: Legibly mark to record actual construction.
 - 4. Specifications and Addenda: Legibly mark up each Section.
 - 5. Shop Drawings: Maintain as record documents and legibly annotate drawings to record changes made after review.
- D. Submittals:
 - 1. At completion of Project, deliver three (3) copies of documents to Engineer.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01740
WARRANTIES AND BONDS

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. This Section specifies general administrative and procedural requirements for warranties and bonds required by the Contract Documents, including manufacturers ' standard warranties on products and special warranties.

1.2 RELATED WORK

- A. Refer to Conditions of Contract for the general requirements relating to warranties and bonds.
- B. General closeout requirements are included in Section 01700 Project Closeout.
- C. Specific requirements for warranties for the work and products and installations that are specified to be warranted are included in the individual Sections of Division 2 through 16.

1.3 SUBMITTALS

- A. Submit written warranties to the Town prior to the date fixed by the Engineer for Substantial Completion. If the Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion for the work, or a designated portion of the work, submit written warranties upon request of the Town.
- B. When a designated portion of the work is completed and occupied or used by the Town, by separate agreement with the Contractor during the construction period, submit properly executed warranties to the Town within fifteen (15) days of completion of that designated portion of the Work.
- C. When a special warranty is required to be executed by the Contractor, or the Contractor and a subcontractor, supplier or manufacturer, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the Town for approval prior to final execution.
- D. Refer to individual Sections of Divisions 2 through 16 for specific content requirements, and particular requirements for submittal of special warranties.

1.4 WARRANTY REQUIREMENT

- A. Related Damages and Losses: When correcting warranted work that has failed, remove and replace other work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted work.

- B. Reinstatement of Warranty: When work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.
- C. Replacement Cost: Upon determination that work covered by a warranty has failed, replace or rebuild the work to an acceptable condition complying with requirements of Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective work regardless of whether the Town has benefited from use of the work through a portion of its anticipated useful service life.
- D. Town's Recourse: Written warranties made to the Town are in addition to implied warranties, and shall not limit the duties, obligations, rights and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the Town can enforce such other duties, obligations, rights, or remedies.
- E. Rejection of Warranties: The Town reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the contract Documents.
- F. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the work that incorporates the products, nor does it relieve suppliers, manufacturers and subcontractors required to countersign special warranties with the Contractor.

1.5 DEFINITIONS

- A. Standard Product Warranties are preprinted warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Town.
- B. Special Warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Town.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

DIVISION 02
SITE WORK

SECTION 02015

TEST PITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contract Drawings, General Conditions and Supplementary General Conditions apply to this Section of the Specifications.

1.2 SUMMARY

- A. The work of this Section includes the excavation of test pits where necessary to locate or examine utilities, subsurface structures, pipes, soils, groundwater, or any other obstacles or conditions.
- B. This work shall consist of the satisfactory removal of all materials including, but not limited to, sawcutting pavements, pavement removal, excavation, shoring and bracing, water removal from within pit, stockpiling, satisfactory disposal of surplus or unsuitable material, backfilling, compacting, pavement repair, etc.
- C. Test pits shall be dug as necessary for the Contractor to determine subsurface conditions as indicated on the Contract Drawings or as directed by the Owner's Representative.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Materials used for reconstruction of test pits shall be approved by the Owner's Representative.
- B. Unless otherwise shown or directed, replace excavated materials with equal or better materials.
- C. Unsuitable materials, as determined by the Owner's Representative shall be replaced with compacted granular fill.

PART 3 - EXECUTION

3.1 COORDINATION

- A. Coordinate excavation of test pits with respective utility company, Town of Montville, or other owners having facilities in the vicinity. Check with "Call Before You Dig", 1/800/922-4455 before digging.
- B. Give sufficient notice and allow ample delay time for others to perform necessary work.

- C. Notify the Owner's Representative one-week in advance of digging each test pit.

3.2 CONSTRUCTION METHODS

- A. Perform all work in conformance with applicable safety codes.
- B. Sawcut pavement, curbs or other hard surface materials in neat and straight line. Excavate pits providing clean-cut vertical sides. Provide sheeting, bracing and dewatering wherever necessary.
- C. Dig test pits so as to ensure that underground utilities or structures are not damaged. It shall be the Contractor's sole responsibility for any damages incurred during excavation operations. Any damages shall be repaired or replaced by the Contractor to the satisfaction of the Owner/Responsible Agency/Owner's Representative at the Contractor's own expense.
- D. The Contractor shall measure and record the size, configuration, exact horizontal and vertical location of all utilities, pipes or other obstacles uncovered in the pits. Submit information in written or sketch form to the Owner's Representative and respective utility companies for review. Notify the Owner's Representative of any revealed conflicts which may require design revisions, relocations and/or adjustments as early as possible to avoid unnecessary delays. No work shall be started within areas of conflict until so authorized.
- E. Protect each pit with steel plates, other coverings, fences, barriers or other appropriate materials as deemed necessary.
- F. Do not backfill pits until authorized. Compact backfill materials to at least 95% of maximum density to the subgrade elevation or as otherwise directed.
- G. The surface of test pit areas shall be restored to a condition equal or better than original as approved by the Owner's Representative.

END OF SECTION

SECTION 02060
SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

- A. Work Included: Perform selective demolition in accordance with the Contract Documents. The Work of this Section shall include but not be limited to the following:
 - 1. Selective demolition as required to accommodate new construction and as indicated; including in the Contract Drawings

1.2 DEFINITIONS

- A. Remove: Remove and legally dispose of items except those indicated to be reinstalled, salvaged, or to remain the Owner's property.

1.3 MATERIALS OWNERSHIP

- A. Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain the Owner's property, demolished materials shall become the contractor's property and shall be removed from the site, and disposed of in a legal.

1.4 SUBMITTALS

- A. Proposed schedule of operations, coordination for shutoff, capping, and continuation of utility services as required.
 - 1. Provide a detailed sequence of selective demolition and removal work to ensure uninterrupted progress of Owner's on-site operations.
 - 2. Include proposed methods for both dust and noise control measures.
- B. Photographs or videotape, sufficiently detailed, of existing conditions of adjoining construction and site improvements that might be misconstrued as damage caused by selective demolition operations.

1.5 QUALITY ASSURANCE

- A. General: Engage an experienced firm that has successfully completed selective demolition Work similar to that indicated for this Project.

- B. Regulatory Requirements: comply with governing EPA notification regulations before starting selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
 - 1. All Demolition work shall comply with requirements of the building code of local governing authority having jurisdiction.
- C. The Contractor shall verify the location of all buried structures and remove same to the extent indicated and as required to complete all work under the contract.
- D. Contractor shall verify all conditions at site prior to the start of work.
- E. Contractor shall obtain all necessary permits required for the selective demolition of portions of the existing structures, prior to the commencement of any demolition work.
- F. Notify appropriate agencies of any hazardous materials found at the site. Do not proceed with removal of said substances until so instructed.
- G. Property adjacent to the Project Limit Line shall remain undisturbed and shall be protected by the Contractor.
- H. Coordinate selective demolition work with site earthwork operation.

1.6 JOB CONDITIONS

- A. Occupancy: Adjacent property Owners will occupy portions of the buildings immediately adjacent to areas of selective demolition. Conduct selective demolition work in manner that will minimize need for disruption of Owner's normal operations. Provide minimum of 72 hours advance notice to Owner of demolition activities that will affect Owner's normal operations
 - 1. Condition of Structures: Owner assumes no responsibility for actual condition of structures to be demolished.
- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner insofar as practicable. However, variations within structure may occur by Owner's removal and salvage operations prior to start of demolition work.
- C. Items indicated to be removed but of salvageable value to contractor may be removed from structure as work progresses. Transport salvaged items from site as they are removed.
 - 1. Storage or sale of removed items will not be permitted on site.
- D. Explosives: Use of explosives will not be permitted.
- E. Traffic: conduct selective demolition operations and removal of debris 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 occupied or used facilities without permission from authorities have jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.

- F. Protections: Ensure safe passage of persons around area of demolition. Conduct operation to prevent damage to adjacent buildings, structures and other facilities and injury to persons.
 - 1. Provide shoring, bracing or support to prevent movement, settlement, or collapse of structures to be demolished and adjacent facilities to remain.
- G. Damages: Promptly repair damages caused to adjacent facilities by demolition operations.
- H. Flame cutting: do not use cutting torches for removal of material to be salvaged. Do not use cutting torches for removal until work area is cleared of flammable materials. Maintain portable fire suppression devices during flame-cutting operations.
- I. Utility Services: Maintain existing utilities indicated to stay in service and protect against damage during demolition operations.
- J. Environmental Controls: Use temporary enclosures, water sprinkling, and other methods to limit dust and dirt migration. Comply with governing regulations pertaining to environmental protection.
 - 1. Do not use water when it may create hazardous or objectionable conditions such as damage to finishes, flooding, and pollution.

PART 2 - PRODUCTS

2.1 REPAIR MATERIALS

- A. Use repair materials identical to existing materials.
 - 1. Where identical materials are unavailable or cannot be used for exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible; subject to the approval of the Owner's Representative.
 - 2. Use materials whose installed performance equals or surpasses that of existing materials. Contractor to submit supporting technical data as required for each material.
- B. 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.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. General: Prior to commencement of selective demolition operations, verify that existing utilities have been located, identified, disconnected and capped.
- B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

- C. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.
- D. When unanticipated mechanical, electrical or structural elements that conflict with the intended function or design are encountered, investigate and measure the nature and extent of the conflict. Promptly submit a written report to the Owner's Representative.
- E. Perform survey as the Work progresses to detect hazards resulting from selective demolition activities.

3.2 UTILITY SERVICES

- A. Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
 - 1. Do not interrupt existing utilities serving occupied or operating facilities, except when authorized in writing by Owner and authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to Owner and to governing authorities.
 - a. Provide not less than 72 hours notice to Owner if shutdown of service is required during changeover.
- B. Utility Requirements: Refer to other Sections of the Specification for shutting off, disconnecting, removing, and sealing or capping utility services. Do not start selective demolition work until utility disconnecting and sealing have been completed and verified in writing.

3.3 PREPARATION

- A. General: provide shoring, bracing, or support to prevent movement, settlement, or collapse of areas to be demolished and adjacent facilities to remain.
 - 1. Cease operations and notify Owner's Representative immediately if safety of structure appears to be endangered. Take precautions to support structure until determination is made for continuing operations. Maintain shoring and bracing throughout the term of this contract.
 - 2. Locate, identify, stub off and disconnect utility services that are not indicated to remain.
 - a. Provide bypass connections as necessary to maintain continuity of service to designated area of building. Provide minimum of 72 hours advance notice to Owner if shutdown of service is necessary during changeover.

3.4 SELECTIVE DEMOLITION

- A. Pollution Controls: Use water sprinkling, temporary enclosures and other suitable methods to limit dust and dirt rising and scattering in air. Comply with governing regulations pertaining to environmental protection.
 - 1. Do not use water when it may create hazardous or objectionable conditions such as ice, flooding and pollution.

- B. Clean adjacent structures and improvements of dust, dirt and debris caused by demolition operations. Return adjacent areas to condition existing prior to start of work.
- C. Demolition General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete Work within limitations of governing regulations and as follows:
 - 1. Proceed with selective demolition systematically, from higher to lower level, and in coordination with the overall project schedule. Complete selective demolition work above each tier before disturbing supporting members on lower levels.
 - 2. Neatly cut openings and holes plumb, square and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. To minimize disturbance of adjacent surfaces, use hand or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
 - 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 - 4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
 - 5. Maintain adequate ventilation when using cutting torches.
 - 6. Remove decayed, vermin-infested or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 - 7. Locate selective demolition equipment throughout the structure and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 - 8. Dispose of demolished items and materials promptly. On-site storage or sale or removed items is prohibited.
 - 9. Return elements of construction and surfaces to remain to condition existing before start of selective demolition operations.
- D. Demolish concrete and masonry in small sections. Cut concrete and masonry at junctures with construction to remain, using power-driven masonry saw or hand tools; do not use power-driven impact tools.
- E. If unanticipated mechanical electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure both nature and extent of the conflict. Submit report to the Owner's Representative in written, accurate details. Pending receipt of directive from the Owner's Representative, rearrange selective demolition schedule as necessary to continue overall job progress without undue delay.

3.5 CONCRETE PLACEMENT

- A. General: Remove daily from site accumulated debris, rubbish, and other materials resulting from demolition operations.
 - 1. If hazardous materials are encountered during demolition operations, comply with applicable regulations, laws and ordinances concerning removal, handling and protection against exposure or environmental pollution.

- B. Removal: Transport materials removed from demolished structures and legally dispose off site.

3.6 CLEANUP AND REPAIR

- A. General: upon completion of demolition work, remove tools, equipment and demolished materials from site.
 - 1. Repair demolition performed in excess of that required. Return elements of construction and surfaces to remain to condition existing prior to start operations. Repair adjacent construction or surfaces soiled or damaged by demolition work.
 - 2. Clean adjacent areas, of all dust, dirt and debris caused by selective demolition, cutting, and patching operations. Daily and final clean up shall be satisfactory to the Owner's Representative.

END OF SECTION

SECTION 02100
SITE CLEARING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. A. Work Included: This Section generally includes site clearing as indicated on drawings, including excavation and backfilling for the following:
1. Protection of existing trees.
 2. Removal of trees and other vegetation.
 3. Topsoil stripping.
 4. Clearing and grubbing.
 5. Removing above-grade improvements.
 6. Removing below-grade improvements.

1.2 PROJECT CONDITIONS

- A. Traffic: Conduct site clearing to ensure minimum interference with roads, streets, walks, and other adjacent properties. Do not close or obstruct streets, or other occupied without permission from authorities having jurisdiction.
- B. Protection of Existing Improvements: Provide protection necessary to prevent damage to existing improvements indicated to remain.
1. Protect improvements on adjoining properties and on Town property.
 2. Restore damaged improvements to their original condition, as acceptable to property owners.
- C. Protection of Existing Trees and Vegetation: Protect existing trees and other vegetation indicated to remain, against unnecessary cutting, damage or smothering of trees by stockpiling within drip line, excess foot or vehicular traffic, or parking of vehicles within drip line. Provide temporary guards to protect trees and vegetation.
1. Water trees and other vegetation to remain within limits of contract work to maintain their health during construction.
 2. Protect roots over 1-1/2 inch diameter that are cut during construction. Coat cut faces with an emulsified asphalt, or other acceptable coating. Temporarily cover exposed roots with wet burlap to prevent roots from drying out; cover with earth as soon as possible.
 3. Repair or replace trees and vegetation indicated to remain which are damaged by construction operations, in a manner acceptable to the Town. Employ a licensed arborist to repair damages to trees and shrubs.
 4. Replace trees which cannot be repaired and restored to full growth status, as determined by the arborist.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 SITE CLEARING

- A. General: Remove trees, shrubs, grass and other vegetation, improvements or obstructions as required to permit installation of new construction. "Removal" includes digging out and off-site disposing of stumps and roots.
 - 1. Cut minor roots and branches of trees indicated to remain in a clean and careful manner, where such roots and branches obstruct new construction.
- B. Topsoil: Topsoil is defined as friable organic clay loam surface soil found in a depth of not less than 4 inches. Satisfactory topsoil is reasonably free of subsoil, clay lumps, stones, and other objects over 2 inches in diameter, and without weeds, roots, and other objectionable material.
 - 1. Strip topsoil to whatever depths encountered in a manner to prevent intermingling with underlying subsoil or other objectionable material.
 - a. Remove heady growths of grass from areas before stripping.
 - b. Where existing trees are indicated to remain, leave existing topsoil in place within drip lines to protect root system.
 - 2. Stockpile topsoil in storage piles in areas indicated or directed. Construct storage piles to provide free drainage of surface water. Cover storage piles, if required, to prevent wind erosion.
 - 3. Dispose of unsuitable or excess topsoil same as specified for disposal of waste material.
- C. Clearing and Grubbing: Clear site of trees, shrubs and other vegetation, except for those indicated to be left standing.
 - 1. Completely remove stumps, roots, and other debris protruding through ground surface.
 - 2. Use only hand methods for grubbing inside drip line of trees indicated to remain.
 - 3. Fill depressions caused by clearing and grubbing with satisfactory soil, unless further earthwork is indicated.
 - a. Place fill material in horizontal layers not exceeding 6 inches loose depth, and thoroughly compact to a density equal to adjacent original ground.
- D. Removal of Improvements: Remove existing above-grade and below-grade improvements as necessary for new construction.

3.2 DISPOSAL OF WASTE MATERIALS

- A. Removal: Transport non-combustible waste materials and unsuitable topsoil materials to designated State approved landfill site and dispose of legally.

END OF SECTION

SECTION 02118

SAW CUT EXISTING PAVEMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contract Drawings, General Conditions and Supplementary General Conditions apply to this Section of the Specifications.

1.2 SUMMARY

- A. The work of this Section shall consist of saw cutting existing bituminous, concrete pavement and concrete retaining walls or other encountered pavements, as well as curbs, etc., as necessary for installation of the proposed work.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 CONSTRUCTION METHODS

- A. All pavement to be removed shall be cut uniformly along lines as shown on the Contract Drawings or as directed.
- B. Concrete pavements and/or bases shall be cut with an approved concrete saw through a minimum of one third of the depth of the pavement or base. The remaining depth may be removed carefully by approved methods.
- C. Bituminous pavements/base shall be saw cut or other methods if straight edge can be attained.
- D. Bituminous curbs shall be cut at the designated lines. Stones or concrete curbs shall be removed to the nearest joint or saw cut as directed.

END OF SECTION

SECTION 02150

SHEETING AND STAYBRACING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contract Drawings, General Conditions and Supplementary General Conditions apply to this Section of the Specifications.

1.2 SUMMARY

- A. The Contractor shall install sheeting or staybracing as necessary in order to comply with the applicable Safety Code; to accommodate traffic; to permit access to adjacent occupied properties; to protect adjacent buildings, pavements, structures, and all existing utilities; to provide an opening of proper depth and width in which to install the proposed pipes and other underground structures, and to protect his workmen, employees of the Town and Engineer, and the public, from death or injury from bank failure, earth collapse or earth movement of any nature whatsoever. In general, all trenches and excavations over 5 feet in depth shall be protected against the hazard of collapse.
- B. The Contractor shall be entirely and solely responsible for the adequacy and sufficiency of all supports and of all sheeting, bracing, shoring, underpinning, cofferdamming, etc. The Contractor shall assume the entire and sole responsibility for damages from injury to persons or damage to adjacent pavements and public and private property (including but not limited to, the work under construction, existing buildings, facilities, etc.) which injury or damage results directly from the Contractor's failure to install or to leave in place adequate and sufficient supports, sheeting, bracing, underpinning, cofferdamming, etc.
- C. The Contractor shall submit his proposed sheeting and/or shoring plans to the Engineer and to any others as required by law or as elsewhere specified prior to the installation of any sheeting and/or shoring. These plans should include, but not be limited to, the type of sheeting or shoring, sizes and dimensions, bracing, spacing, methods of installation and removal, etc.
- D. All sheeting shall be designed and sealed by a Professional Engineer licensed to practice in the State of Connecticut. He shall be known as the Contractor's Engineer.
- E. Sheeting, shoring, or other timbering may be left-in-place at the option of the Contractor when needed to protect other existing facilities or the work constructed or to be constructed under this Contract, unless shown/indicated on the Contract Plans to be removed.
- F. It is expressly understood and agreed that removing or leaving-in-place any sheeting or shoring, etc. as described above, shall not relieve the Contractor from any responsibility for any loss or damage due to omission of or failure of the sheeting, etc., failure to leave it in place, or the settling of the backfill, or any movement of the ground or any structure or object adjacent to any trench or excavation made by the Contractor. The Engineer will not order any sheeting, etc. left-in-place at the expense of the Owner in order to accommodate the convenience of the Contractor or to save him the cost of its removal.

- G. The Contractor may, with the approval of the Engineer, lay back slopes in accordance with the provisions of the applicable Safety Code in order to avoid the necessity for sheeting or limiting the quantity thereof. However, in the case of trenches, the toe of this slope will not be lower than one foot above the top of the pipe to be installed. A level bench of at least two (2) feet in width shall be maintained between the toe of the sloped section and vertical trench excavation for pipes with an outside diameter of six (6) feet or less. Where sloping is used as a substitute for sheeting or staybracing, or used in combination therewith, it shall be sloped a minimum of one horizontal to one vertical except where instability of the material requires a slope flatter than one to one.
- H. There shall be no obligation on the part of the Engineer to issue orders for sheeting, staybracing, or sheeting left-in-place and/or to pass upon sufficiency and adequacy of sheeting; nor shall the failure on the part of the Engineer to give such orders relieve the Contractor from liability for damages from injury to persons or damage to property occurring from or upon the work and occasioned by negligence, or otherwise growing out of the Contractor's failure to either install sufficient and adequate sheeting and/or staybracing or to leave in place in the excavation sufficient and adequate support to prevent the caving in or moving of the ground adjacent to the sides of the excavation during and after the backfilling operation.

1.3 SUBMITTALS

- A. Layout drawings for sheeting and staybracing and other related data prepared by the Contractor's Engineer. System design, locations and calculations shall be prepared in a manner and form acceptable to the Owner's Representative, the Engineer and local authorities having jurisdiction.

1.4 QUALITY ASSURANCE

- A. Engineer Qualifications: The Contractor's Engineer shall be authorized to practice in the State of Connecticut and shall be experienced in providing successful engineering services for sheeting and staybracing systems similar in extent required for this project.
- B. Supervision: Engage and assign supervision of sheeting and staybracing system to a qualified professional engineer foundation consultant.
- C. Regulations: Comply with codes and ordinances of governing authorities having jurisdiction.

1.5 JOB CONDITIONS

- A. Before starting work, verify governing dimensions and elevations. Verify condition of adjoining properties. Take photographs to record any existing settlement or cracking of structures, pavements, and other improvements. Prepare a list of such damages, verified by dated photographs, and signed by Contractor and other conducting investigation.
- B. Survey adjacent structures and improvements, employing a professional land surveyor, registered in the State of Connecticut, establishing exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations.

- C. During excavation, re-survey benchmarks weekly, maintaining accurate log of surveyed elevations for comparison with original elevations. Promptly notify the Owner's Representative if changes in elevations occur or if cracks, sags, or other damage is evident.

1.6 EXISTING UTILITIES

- A. Protect existing active sewer, water, gas, electric and other utility services and structures.
- B. Notify municipal agencies and service utility companies having jurisdiction. Comply with requirements of governing authorities and agencies for protection, relocation, removal, and disconnecting of services.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Provide adequate shoring and bracing materials which will support loads imposed. Materials need not to be new, but should be in serviceable condition.
- B. Structural Steel: ASTM A 36.
- C. Steel Sheet Piles: ASTM A 328.
- D. Timber Lagging: Any species, rough-cut, mixed hardwood, nominal 3 inches thick, unless otherwise indicated.
- E. Steel Pipe: ASTM A501.

PART 3 - EXECUTION

3.1 CONSTRUCTION METHODS

- A. Trench shields shall not be used unless requested by the Contractor and authorized by the Engineer. If authorized, they shall be used only when the protection of only workmen is involved, not for support for existing adjacent utilities, structures, embankments, etc. A trench protected by the use of a trench shield shall not be considered a sheeted trench.
- B. Unless expressly authorized by the Engineer, sheeting shall be driven ahead of the excavation to avoid loss of material from behind the sheeting. If it is necessary to excavate below the sheeting to facilitate driving, care shall be taken to avoid trimming behind the face along which the sheeting will be driven. Care shall be taken to prevent voids outside of the sheeting.
- C. All sheeting and staybracing shall be securely installed and properly braced in accordance with the applicable Safety Code.
- D. The depth of pilot cuts for trenches or structures shall not exceed five (5) feet in depth at any time. The Engineer may reduce the depth of the pilot cut should the soil and subsurface conditions

warrant such action. Sheet piling must be driven by drop hammer or other methods approved in by the Engineer below the area of the pilot cut. Driving of sheet piling above the pilot cut is subject to the directions of the Engineer. The Engineer may direct the Contractor to use other types of equipment, and to revise the procedure during the excavation of the pilot cut and the driving of the sheet piling should it be found necessary to do so.

- E. Vibratory driving hammers shall not be used unless specifically authorized by the Engineer.
- F. Where wooden sheet piling cannot be driven due to the nature of the material, then steel sheet piling may be driven and removed in lieu of wooden sheet piling providing the following procedures are followed:
 - 1. Backfilling of sheeted trenches or areas shall proceed by one of the following two (2) methods:
 - a. Simultaneously with the withdrawal of sheet piling and as each layer is compacted in accordance with Section "Trench Excavation, Backfilling and Compaction"; or
 - b. The trench/area will be backfilled to the surface. If the sheet piling is to be withdrawn, backfilling will proceed up to each set of rangers and braces; the rangers and braces will be removed; the backfilling will proceed up to the next set of rangers and braces, etc. - up to the top of the excavation. The backfill material shall be compacted to 98% of the maximum dry density as determined by AASHTO T 99, Method C. Alternate sections of sheet piling from the left side and right side of the trench/area shall be removed and the cavity remaining therefrom shall be jetted thoroughly by high pressure water, starting at the toe of the sheet piling and being drawn to the surface. Sand shall be inserted with the jetting process.
- G. Where the bottom of the excavation is not free draining material (some areas of organic material or miscellaneous fill) or where granular backfill is not available or ordered by the Engineer, the jetting shall be very carefully done with a minimum amount of water being expended. In such locations, the Contractor may request the approval of the Engineer for other compaction methods in the sheet piling cavity.
- H. The Contractor shall remove the sheet piling and/or staybracing from the excavation except where it is specifically indicated on the Contract Drawings "To Be Left-In-Place" or the Contractor may elect to leave the sheet piling and/or staybracing in place for his own convenience or to serve his own to protect existing facilities, the work constructed or to be constructed under this Contract, or for the safety of the public, etc., at no cost to the Owner. No sheet piling or bracing which is within three (3) feet of the existing or proposed finished grade may be left-in-place without the prior permission of the Engineer. This may require that the Contractor cut off sheet piling at this elevation at no additional cost to the Owner.
- I. Where sheet piling, regardless of the type of sheet piling used, is left in place, as specified or ordered or at the Contractor's convenience option, unless otherwise specifically permitted in writing by the Engineer, all elements such as rangers, braces, wales, etc. shall be left in place except as specified hereinbefore; and, except such temporary braces required to be removed to make way for the structure or utility. Where it is necessary to remove such temporary braces, the sheet piling shall be rebraced but in no case shall sheet piling be braced against the sides of the structure or utility to be constructed unless approved in writing by the Owner of the structure or utility. Where lagging and "soldier" beams are used, the "soldier" beams and all the braces shall also be left in place.

- J. Where wood sheeting has been driven below the excavation bottom to provide for a "toe-in", no wood sheeting below the top of pipe or structure shall be removed but cut off at this elevation and the remaining sheeting above this line removed as described herein.
- K. Sheeting shall be cut away and removed from in front of capped outlets or other branches or inlets set in the pipe for future connections.
- L. All sheeting, shoring, and bracing removed shall be carefully removed from the excavation in such a manner as not to endanger the completed work or any adjacent pavements, buildings, structures, utilities, property, etc. The sheeting shall be withdrawn to such an extent that it is just above the backfill material being compacted and all voids left or caused by the withdrawal of such sheeting, shall be immediately refilled with approved material and compacted at no additional cost to the Owner.
- M. Where the excavation is to be left open during non-working hours, the sheeting shall extend 42 inches above the open excavation.

END OF SECTION

SECTION 02205
DUST CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contract Drawings, General Conditions and Supplementary General Conditions apply to this Section of the Specifications.

1.2 SUMMARY

- A. The work of this Section consists of furnishing water equipment, water and/or calcium chloride for allaying dust conditions on the site. The Contractor shall furnish a pickup sweeper and accessory equipment and utilize it for the removal of earth and/or other dust producing materials from paved surfaces for the purpose of allaying dust conditions on the site. This work shall be done as directed by the Owner's Representative, at least once a week, and shall meet the referenced portions of "Form 818".

1.3 QUALITY ASSURANCE

- A. Codes and Standards: Comply with provisions of following, except otherwise indicated:
 - 1. References to "Form 818" means the State of Connecticut Department of Transportation "Standard Specification for Roads, Bridges and Incidental Construction, 2020", including any interim and supplemental specifications.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- A. Calcium Chloride: Articles 9.42.02 and 9.42.03 of "Form 818".
- B. Water: Article 9.43.03 of "Form 818".
- C. Water Equipment: Article 9.40.3 of "Form 818".
- D. Sweeping for Dust Control: Article 9.39.03 of "Form 818".

PART 3 - EXECUTION

3.1 CONSTRUCTION METHODS

- A. Should the Contractor, after notice from the Owner's Representative, fail to provide Dust Control on the site, the Owner immediately and without further notice, may furnish dust control equipment/sweepers as necessary to rectify the situation. The cost of such shall be borne by the Contractor and may be deducted from any amounts due the Contractor.

END OF SECTION

SECTION 02215
PAVEMENT REMOVAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Contract, including General and Supplemental Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. The work under this Section shall consist of the satisfactory removal of all bituminous concrete and concrete pavements and/or bases which are not removed or to be removed under other Sections of work, the removal of which is required for trench, structure or test pit excavation and as directed by the Owner's Representative. "Pavement Removal" will not be classified by type or depth unless otherwise shown in the Bid Proposal. Work under this Section shall include the satisfactory removal and disposal of all temporary pavements subsequent to completion of final paving.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 CONSTRUCTION METHODS

- A. All pavement and/or base to be removed under this Section shall be neatly removed within the limits shown on the Contract Drawings or as directed by the Owner's Representative. Care shall be exercised by the Contractor during breaking and removal of the pavement and base in order that the adjacent pavement and/or base outside the area of removal will not be damaged. Saw cut the perimeter of the area to be excavated prior to any removals.
- B. All excavated pavement and/or base shall be disposed of and removed from the site by the Contractor at a disposal area supplied by the Contractor at no additional cost to the Owner.
- C. No section or pieces of pavement and/or base shall be used for trench backfill and all such material shall be kept separate from other excavated materials.

END OF SECTION

SECTION NUMBER 02220

EXCAVATION BACKFILLING AND COMPACTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contract Documents, General Conditions and Supplementary General Conditions apply to this Section of the Specifications.
- B. The requirements of Appendix 1 — "Geotechnical Investigation Proposed Headworks Building and Grit Chamber, Waste Water Treatment Plant Town of Montville, Connecticut" dated May 2012 apply to this Section of the Specifications.

1.2 SUMMARY

- A. Without limitations, the work of this Section includes the following:
 - 1. General site excavation for all improvements including pavement removal.
 - 2. Removal and satisfactory off-site disposal of unsuitable materials, excess materials or designated items.
 - 3. Rough grading.
 - 4. Backfill and compaction.
 - 5. Testing of materials to be used.
 - 6. Dewatering excavations.
- B. Classification: All excavations shall be "Unclassified", defined as removal of all materials regardless of its nature including rock and unsuitable material excavation. Excavation of rock or unsuitable material beyond the required contract limits, as authorized by the Owner's Representative, shall be "Classified" and costs are to be determined in accordance with provisions outlined in Division 1.
 - 1. Rock excavation shall include rock in definite ledge formation and boulders, or portions of boulders, three (3) cubic yards, or more, in volume.
 - 2. Unsuitable Material Excavation: Defined as any material, containing vegetation or organic matter, such as muck, peat, organic silt, sod, loose to very dense, brown to dark brown silty sand with gravel, trace brick, cobbles, asphalt and coal, or any other encountered material considered by the Engineer as having unsuitable in-site bearing properties (clay). All encountered unsuitable materials shall be removed and disposed of legally off the project, unless otherwise directed.
 - 3. Common Fill: Mineral soil, free of clay, organic soil, deleterious material, and particles larger than 10 in. in size, which can be spread and compacted.

1.3 QUALITY ASSURANCE

- A. Codes and Standards: Comply with provisions of following, except otherwise indicated:

1. AASHTO: Refers by number, letter, or both, to the latest specification or test method of the American Association of State Highway and Transportation Officials.
 2. ASTM: Refers by numbers, letter, or both, to the latest specification or test method of the American Society for Testing and Materials.
 3. References to "Form 818" mean the State of Connecticut Department of Transportation "Standard Specification for Roads, Bridges and Incidental Construction, 2018", including the supplemental specifications.
- B. Field Quality Control: Compaction testing will be done by the Contractor.
- C. Testing Laboratory: The Contractor shall be responsible for compaction tests required under this Section.

1.4 SUBMITTALS

- A. The Contractor shall submit test reports and gradation analyses of all materials to be used which are from off-site and on-site sources to the Owner's Representative for approval.
- B. The Contractor shall submit compaction test reports as required under Section 3.10C and 3.10D to the Owner's Representative for approval.

1.5 PROTECTION

- A. Protect existing structures, fences, pavement, curb, etc.
- B. Protect above and below grade utilities which are to remain.
- C. Protect excavations by shoring, bracing, sheet piling, or other methods required to prevent cave-in or loose soil from falling into excavation.
- D. Notify the Owner's Representative of unexpected subsurface conditions and discontinue affected work in area until notified to resume work.
- E. Protect bottom of excavations and soil adjacent to and beneath foundations from frost.
- F. Grade excavation top perimeter to prevent surface water runoff into excavation.
- G. Repair damage at no additional cost to the Owner.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Fill below the proposed pavement subbase elevation shall be compacted granular fill. Common fill material may be used for raising grades below pavement sections and in landscaped areas.
- B. Required fill under or around the various required site elements shall be compacted granular fill unless otherwise shown or directed (comply with Section 02234).

- C. Where unsuitable material is excavated and removed, backfill and/or refill shall be compacted granular fill meeting requirements of Section 02234.

2.2 ACCESSORIES

- A. Warning Tape: Acid and alkali resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of the utility; colored as given in Section 2.2.C.
- B. Detectable Warning Tape: Acid and alkali resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, minimum 6 inches (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches (750 mm) deep; colored as given in Section 2.2.C.
- C. Underground Utility Warning Tape Color Codes:
 - 1. Red: Electric.
 - 2. Yellow: Gas, oil, steam, and dangerous materials.
 - 3. Green: Storm and sanitary sewers and drainage systems, including force mains.
 - 4. Blue: Water.
 - 5. Orange: Communication lines or cables.
- D. Filter Fabric: Mirafi Construction Products 140N, ConTech C26NW, SI Geosolutions Geotex 401 or approved equivalent.

PART 3 - EXECUTION

3.1 GENERAL

- A. Without limitations, comply with Sections of "Form 818" and as modified herein.
 - 1. Roadway Excavation, Formation of Embankment, Disposal of Surplus Materials and Channel Excavation Section 2.02.03
 - 2. Structure Excavation Section 2.03.03
 - 3. Ditch Excavation Section 2.06.03

3.2 PREPARATION

- A. Verify existing conditions and required lines, levels, contours and datum.
- B. Stake and flag existing, known above and below-ground utilities.
- C. Coordinate with respective utility companies or others doing work in the vicinity.
- D. Upon discovery of unknown utility or concealed conditions, discontinue affected work, notify the Owner's Representative.

3.3 PAVEMENT AND CURB REMOVAL

- A. The work for pavement removal shall consist of satisfactory removal of all existing bituminous, concrete or other pavements to the limits designated on the Drawings or directed as well as curbs, etc. as necessary for installation of the proposed work.
- B. All pavements to be removed shall be cut uniformly along the required lines. Concrete pavement or bases shall be cut with an approved concrete saw through a minimum of one-third of the pavement or base depth. The remainder may be removed by other methods. Bituminous pavements or bases may be cut with a saw, pneumatic spade edger or other method if straight edge can be attained.
- C. Concrete curbs shall be cut or removed to the nearest joint. Bituminous curbs shall be saw cut.
- D. Care shall be exercised during breaking and removal of the pavements and curbs in order that adjacent areas outside the curb lines will not be damaged.

3.4 GENERAL EXCAVATION

- A. Excavate all material required for proposed structures, pavement, mechanical, electrical and other work as indicated on the Drawings.
- B. Excavate to the working elevations indicated. Allow ample room for forming, inspection and other required work.
- C. Excavation shall not interfere with normal 33 degree bearing of any foundation.
- D. Temporary excavations above groundwater level shall have side slopes no steeper than 1.5H: 1 V.
- E. All excavations shall be performed in accordance with current OSHA regulations. Conformance to OSHA requirements is the sole responsibility of the contractor.
- F. Hand trim excavations and leave free of loose matter.
- G. Remove lumped subsoil boulders, loose rock and other debris from excavation.
- H. Correct unauthorized excavations at no cost to the Owner.
- I. Fill over-excavated areas or unsuitable material excavations with compacted granular fill as directed by the Owner's Representative.
- J. Remove excess excavated material from site for disposal in accordance with Section 02220 1.2 B.2.

3.5 EXCAVATION FOR STRUCTURES

- A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. If applicable, 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.
2. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures:
3. Excavate to elevations and dimensions indicated within a tolerance of plus or minus 1 inch. Do not disturb bottom of excavations intended as bearing surfaces.

3.6 ROCK EXCAVATION

- A. Construction methods, comply with Article 2.02.03 of "Form 818" and as amended or required herein.
 1. Rock excavation shall include the excavation, removal and disposal of all boulders and detached rock fragments 3 cubic yard or more in volume and all ledge rock, the removal of which, in the opinion of the Owner's Representative, can be accomplished only by drilling and splitting mechanically or by hand or by blasting. Boulders of less than 3 cubic yard in volume and all soft or disintegrated rock which can be removed without the manipulation noted above, shall be classified as "earth excavation".

3.7 UNSUITABLE MATERIAL EXCAVATION AND BACKFILL

- A. Excavate unsuitable materials to required limits as shown on the Drawings or as directed by the Owner's Representative. Backfill with compacted granular fill.

3.8 BACKFILLING AND EMBANKMENT

- A. Compacted granular fill used as structural fill below and adjacent to structures shall be placed in accordance with the requirements of Appendix 1 — "Geotechnical Investigation Proposed Headworks Building and Grit Chamber, Waste Water Treatment Plant Town of Montville, Connecticut" dated May 2012.
- B. Backfill systematically, as early as possible. Use unfrozen materials. Do not backfill over porous, wet spongy or frozen subgrade surfaces.
- C. Place compacted granular fill in continuous layers not exceeding nine (9) inches. Depths indicated refer to loose material measure.
- D. Use placement method that will not disturb or damage adjacent structures, utilities or other work.
- E. Maintain optimum moisture content of backfill materials to attain required compaction densities.
- F. Backfill uniformly against support foundation walls or structures. Backfill simultaneously on each side of unsupported walls or structures.
- G. Slope backfill grade away from building or structure.
- H. Make changes in grade gradual. Blend slopes into level areas.

- I. Remove surplus backfill materials from site.
- J. In the construction of embankments, layer placement shall begin in the deepest portion of the fill; as placement progresses, layers shall be constructed approximately parallel to the finished pavement grade line.

3.9 ROUGH GRADING

- A. Coordinate subgrade elevations with required depths for pavement cross-sections, slabs and footings, selected or imported fill and topsoil areas.
- B. Shape subgrade elevations, less required controlled fill depths, to within reasonably close conformity to the lines and elevations indicated on the Contract Drawings.
- C. All ruts or rough places that develop shall be smoothed and recompacted.
- D. Provide uniform slopes and contoured subgrade surfaces to provide positive drainage. In areas where topsoil is to be spread, remove stones larger than two inch diameter and other debris.

3.10 COMPACTION REQUIREMENTS

- A. Compact all subgrade soils thoroughly prior to placing required controlled fills.
- B. Recommended compaction requirements are as follows:
 - 1. Beneath and around Footings, under slabs – 95%
 - 2. Parking, roadways, and sidewalks – 92% up to 3ft below finished grade and 95% in the upper 3ft.
 - 3. Landscaped Areas - 95
- C. Minimum compaction requirements refer to percentages of the maximum dry density determined in accordance with ASTM D1557 method C.

3.11 COMPACTION CONTROL TESTS

- A. This Specification shall govern the determination of the maximum density, field density, and percent compaction of those materials for which a minimum percent compaction is specified. It covers the basic procedures to be followed in performing the test for maximum density, field density, and percent compaction. In all cases, density shall be stated as the dry weight in pounds per cubic foot.
- B. Maximum density is defined as the maximum dry weight in pounds per cubic foot obtained when a material is mixed with different percentages of water and compacted in a standard manner. The percentages of water at which maximum density is obtained is termed the optimum moisture content.
- C. Laboratory Compaction Tests: The maximum density shall be determined by the appropriate method shown below: (Equivalent ASTM Tests may be substituted).

1. All particles passing a 3/4" sieve shall be tested in accordance with AASHTO T 180, Method D.
 2. Where the material contains particles larger than 3/4 inch, follow the replacement procedure given in the note under Method C of AASHTO T99 or 80.
- D. Field Density: Field density refers to the dry density expressed in pounds per cubic foot of a layer of compacted material in place at the site as determined by a sample representative of the compact layer. The field density shall be determined in accordance with AASHTO T 147, AASHTO T181, ASTM D1556, ASTM D2157, or other methods approved by the Owner's Representative.
1. The percent compaction is defined as the density of the compacted layer expressed as a percentage of the maximum density of the material when tested in accordance with these Specifications.
 2. The percentage of compaction is computed by the formula:
$$\text{Percent Compaction} = (\text{Field Density} / \text{Maximum Density}) \times 100$$
 3. The mold to be used for testing will be 6.11 inches high.
 4. Unless otherwise directed, one density test per lift for every 1,000 square feet of controlled fill under site pavement and for every 200 square feet of controlled fill under site structures shall be performed.
 5. If tests indicate work does not meet specified requirements, remove work and replace at no cost to the Owner.

3.12 DEWATERING

- A. The Contractor shall keep excavations free from water at all times as required. Excavations shall be dewatered to a sufficient depth below the bottom of excavation to allow compaction of the backfill to be accomplished as specified. Refer to Section 02240 for Dewatering.

3.13 SHORING, BRACING AND SHEETING

- A. Provide, install, maintain and remove all temporary and permanent sheeting and bracing, as required, in accordance with Section 02150, to permit the proper installation and construction of the work; to prevent injury to persons or damage to pavements, utilities or structures; to prevent injurious caving or erosion, or loss of ground; and to maintain at all times pedestrian and vehicular traffic.

3.14 SLABS-ON-GRADE

- A. Slabs-on-Grade shall be constructed in accordance with the requirements of Appendix 1 – "Geotechnical Investigation Proposed Headworks Building and Grit Chamber, Waste Water Treatment Plant Town of Montville, Connecticut" dated May 2012.
 1. Slabs-on-Grade shall be supported on suitable densified, granular on-site soils or structural fill.

2. Prior to floor slab construction, all subgrades should be thoroughly proof-rolled with a smooth drum vibratory compactor that imparts a total applied force (static plus dynamic) of at least 500 pounds per lineal inch of drum width.
3. Any soft materials that cannot be densified by additional compaction should be removed and replaced with structural fill.
4. Any materials that were loosened by previous construction activity or weather conditions should be recompacted to the requirements described above.
5. All floor slabs shall be constructed over a capillary break consisting of a 4-inch thick layer of compacted AASHTO No. 57 stone. After compaction, a 10-mil polyethylene vapor barrier shall be provided over the capillary break at bottom of slab.

END OF SECTION

SECTION 02221

TRENCH EXCAVATION, BACKFILLING, AND COMPACTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contract Drawings, General Conditions and Supplementary General Conditions apply to this Section of the Specifications.

1.2 SUMMARY

- A. Without limitations, the work of this Section includes:
 - 1. Trench excavation, bedding, backfill and compaction for all underground piping such as storm drainage pipes, sewer, domestic water, fire protection, underdrain, service laterals, utility ducts, conduit or cable, etc.
 - 2. Disposal of all items to be removed, unsuitable soils or excess materials.
 - 3. Sheet piling and dewatering.
- B. Classification: All excavation for trenches shall be "Unclassified", defined as removal of all materials, including rock and unsuitable materials excavation. Excavation of rock in trench or unsuitable material beyond the required contract limits, as authorized by the Owner's Representative, shall be "Classified".
 - 1. Rock excavation in trench shall include rock in definite ledge formation and boulders, or portions of the boulders, three (3) cubic yards or more in volume.
 - 2. Unsuitable Material Excavation: Defined as any material, containing vegetation or organic matter, such as muck, peat, organic silt, sod, loose to very dense, brown to dark brown silty sand with gravel, trace brick, cobbles, asphalt and coal, or any other encountered material considered by the Engineer as having unsuitable in-site bearing properties (clay). All encountered unsuitable materials shall be removed and disposed of legally off the project, unless otherwise directed.

1.3 QUALITY ASSURANCE

- A. Codes and Standards: Comply with provisions of following, except otherwise indicated:
 - 1. References to "Form 818" means the State of Connecticut Department of Transportation "Standard Specification for Roads, Bridges and Incidental Construction, 2020", including any interim and supplemental specifications.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Backfill

1. Where unsuitable material is excavated and removed, backfill and/or refill shall be Compacted Granular Fill meeting requirements of Section 02234.
2. New material from off-site sources used for backfill under all pavements or structures, as shown on the details, shall be in accordance with the Contract Drawings or shall be Compacted Granular Fill meeting requirements of Section 02234.

B. Pipe Bedding

1. Bedding materials for storm drainage, water, sanitary sewer pipe and their appurtenances shall be 3/4 inch crushed stone, conforming to Article M..01.01 of "Form 818" unless otherwise shown on the Contract Drawings.

PART 3 - EXECUTION

3.1 CONSTRUCTION METHODS

A. Comply with the following Articles of "Form 818"•

1. Trench Excavation – Article 2.05.03
2. Culverts – Article 6.51.03
3. Trenching and Backfilling – Article 10.01.03 (Conduits)

B. Trench backfill under pavements and structures shall be compacted granular fill.

C. Compact bedding and backfill a minimum of 95% of the dry density under all pavements or structures.

D. Refer to Section 02150 for sheeting and staybracing.

E. Refer to Section 02240 for dewatering.

F. Suitable excess trench excavation material shall be used as site fill under the required topsoil or as directed.

END OF SECTION

SECTION 02234

COMPACTED GRANULAR FILL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contract Drawings, General Conditions and Supplementary General Conditions apply to this Section of the Specifications.

1.2 SUMMARY

- A. The work under this Section consists of furnishing and placing compacted granular fill for replacement material for unsuitable materials where not specified elsewhere, as foundation for structures, as bedding material for riprap or other proposed improvements as indicated or detailed on the Drawings.

1.3 QUALITY ASSURANCE

- A. Codes and Standards: Comply with provisions of following, except otherwise indicated:
 - 1. References to "Form 818" means the State of Connecticut Department of Transportation "Standard Specification for Roads, Bridges and Incidental Construction, 2020", including any interim and supplemental specifications.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: provide borrow soil materials when sufficient satisfactory materials are not available from excavations.
- B. Compacted Granular Fill shall conform to the requirements of Structural Fill as outlined in Appendix 1 — "Geotechnical Investigation Proposed Headworks Building and Grit Chamber, Waste Water Treatment Plant Town of Montville, Connecticut" dated May 2012.
- C. Compacted Granular Fill shall consist of well-graded, predominately granular soils meeting the following requirements:
 - 1. Maximum particle size of 2 inches.
 - 2. No more than 12% finer than the No. 200 Sieve
 - 3. Plasticity index of not greater than 6 percent.

PART 3 - EXECUTION

3.1 CONSTRUCTION METHODS

- A. Comply with Appendix 1 — "Geotechnical Investigation Proposed Headworks Building and Grit Chamber, Waste Water Treatment Plant Town of Montville, Connecticut" dated May 2012.

END OF SECTION

SECTION 02235

PROCESSED AGGREGATE BASE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contract Drawings, General Conditions and Supplementary General Conditions apply to this Section of the Specifications.

1.2 SUMMARY

- A. The base shall consist of a two-course foundation for bituminous concrete pavement constructed on a prepared subbase in accordance with the standard specifications and in conformity with the lines, grades, compacted thickness and typical details or cross sections indicated on the Contract Drawings.

1.3 QUALITY ASSURANCE

- A. Codes and Standards: Comply with provisions of following, except otherwise indicated:
 - 1. References to "Form 818" means the State of Connecticut Department of Transportation "Standard Specification for Roads, Bridges and Incidental Construction, 2020", including any interim and supplemental specifications.

1.4 SUBMITTALS

- A. Submit certified test results from a testing laboratory to the Owner's Representative for approval. Test results must indicate characteristics of materials, including gradations.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. All materials for this work shall conform to the requirements of Article M.05.01 of "Form 818". The required depth shall be as indicated on the Contract Drawings. Coarse aggregate shall conform to Article M.05.01-2(a) or M.05.01-2(b).

PART 3 - EXECUTION

3.1 CONSTRUCTION METHODS

- A. Comply with Article 3.04.03 of "Form 818".

END OF SECTION

SECTION 02240
DEWATERING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes construction dewatering.
- B. Related Sections include the following:
 - 1. Division 2 Section "Sheeting and Staybracing".

1.3 PERFORMANCE REQUIREMENTS

- A. Dewatering Performance: Design, provide, test, operate, monitor, and maintain a dewatering system of sufficient scope, size, and capacity to control ground-water flow into excavations and permit construction to proceed on dry, stable subgrades.
 - 1. Work includes removing dewatering system when no longer needed.
 - 2. Maintain dewatering operations to ensure erosion is controlled, stability of excavations and constructed slopes is maintained, and flooding of excavation and damage to structures are prevented.
 - 3. Prevent surface water from entering excavations by grading, dikes, or other means.
 - 4. Accomplish dewatering without damaging existing buildings adjacent to excavation.

1.4 SUBMITTALS

- A. Shop Drawings: For all dewatering systems, show arrangement, locations, and details of wells and well points; locations of headers and discharge lines; and means of discharge and disposal of water.
 - 1. Include layouts of piezometers and flow-measuring devices for monitoring performance of dewatering system.
 - 2. Include a written report outlining control procedures to be adopted if dewatering problems arise.
 - 3. Include Shop Drawings signed and sealed by the qualified professional engineer responsible for their preparation.

- B. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- C. Photographs or videotape, sufficiently detailed, of existing conditions of adjoining construction and site improvements that might be misconstrued as damage caused by dewatering operations.
- D. Record drawings at Project closeout identifying and locating capped utilities and other subsurface structural, electrical, or mechanical conditions.
- E. Field Test Reports: Before starting excavation, submit test results and computations demonstrating that dewatering system is capable of meeting performance requirements.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer to assume engineering responsibility and perform dewatering who has specialized in installing dewatering systems similar to those required for this Project and with a record of successful in-service performance.
- B. Professional Engineer Qualifications: A professional engineer who is legally registered to practice in the State of Connecticut and who is experienced in providing engineering services for designing dewatering systems that are similar to those indicated for this Project in material, design, and extent.
 - 1. Engineering Responsibility: Engage a qualified professional engineer to prepare or supervise the preparation of data for the dewatering system including drawings, testing program, test result interpretation, and comprehensive engineering analysis that shows the system's compliance with specified requirements.
- C. Regulatory Requirements: Comply with water disposal requirements of authorities having jurisdiction.

1.6 PROJECT CONDITIONS

- A. Existing Utilities: Do not interrupt utilities serving facilities occupied by the Owner or others unless permitted in writing by the Owner's Representative and then only after arranging to provide temporary utility services according to requirements indicated.
- 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 the geotechnical engineer and represent interpretations of the subsoil conditions, tests, and results of analyses conducted by the geotechnical engineer. Owner will not be responsible for interpretations or conclusions drawn from this data by Contractor.
 - 1. Make additional test borings and conduct other exploratory operations as necessary.
 - 2. The geotechnical report is included elsewhere in the Project Manual.

- C. Survey adjacent structures and improvements, employing a qualified professional engineer or surveyor, establishing exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations.
 - 1. During dewatering, resurvey benchmarks weekly, maintaining an accurate log of surveyed elevations for comparison with original elevations. Promptly notify Owner's Representative if changes in elevations occur or if cracks, sags, or other damage is evident in adjacent construction.

PART 2 - PRODUCTS (NOT APPLICABLE)

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 created by earthwork operations.
 - 1. Prevent surface water and subsurface or ground water from entering excavations, from ponding on prepared subgrades, and from flooding site and surrounding area.
 - 2. Protect subgrades and foundation soils from softening and damage by rain or water accumulation.
- B. Install dewatering system 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 governing regulations.

3.2 DEWATERING

- A. Install dewatering system utilizing wells, well points, or similar methods complete with pump equipment, standby power and pumps, filter material gradation, valves, appurtenances, water disposal, and surface-water controls.
- B. Before excavation below ground-water level, place system into operation to lower water to specified levels and then operate it continuously until drains, sewers, and structures have been constructed and fill materials have been placed, or until dewatering is no longer required.
- C. Provide an adequate system to lower and control ground water to permit excavation, construction of structures, and placement of fill materials on dry subgrades. Install sufficient dewatering equipment to drain water-bearing strata above and below bottom of foundations, drains, sewers, and other excavations.
 - 1. Do not permit open-sump pumping that leads to loss of fines, soil piping, subgrade softening, and slope instability.

- D. Reduce hydrostatic head in water-bearing strata below subgrade elevations of foundations, drains, sewers, and other excavations.
 - 1. Maintain piezometric water level a minimum of 24 inches (600 mm) below surface of excavation.
- E. Dispose of water removed from excavations in a manner to avoid endangering public health, property, and portions of work under construction or completed. Dispose of water in a manner to avoid inconvenience to others. Provide sumps, sedimentation tanks, and other flow-control devices as required by authorities having jurisdiction.
- F. Provide standby equipment on-site, installed and available for immediate operation, to maintain dewatering on a continuous basis if any part of system becomes inadequate or fails. If dewatering requirements are not satisfied due to inadequacy or failure of dewatering system, restore damaged structures and foundation soils at no additional expense.
 - 1. Remove dewatering system from Project site on completion of dewatering. Plug or fill well holes with sand or cut off and cap wells a minimum of 36 inches (900 mm) below overlying construction.
- G. Damages: Promptly repair damages to adjacent facilities caused by dewatering operations.

3.3 OBSERVATION WELLS

- A. Provide, take measurements, and maintain at least the minimum number of observation wells or piezometers indicated and additional observation wells as may be required by authorities having jurisdiction.
- B. Observe and record daily elevation of ground water and piezometric water levels in observation wells.
- C. Repair or replace, within 24 hours, observation wells that become inactive, damaged, or destroyed. Suspend construction activities in areas where observation wells are not functioning properly until reliable observations can be made. Add or remove water from observation-well risers to demonstrate that observation wells are functioning properly.
 - 1. Fill observation wells, remove piezometers, and fill holes when dewatering is completed.

END OF SECTION

SECTION NUMBER 02260
FORMATION OF SUBGRADE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contract Drawings, General Conditions and Supplementary General Conditions apply to this Section of the Specifications.

1.2 SUMMARY

- A. The area upon which pavements, concrete aprons, structures, site retaining walls, or any other proposed improvements are to be placed shall be known as the subgrade. This is the plane coincident with the bottom of the subbase, or compacted granular fill, as shown on the Contract Drawings or as directed. The work of this Section shall be performed at this plane.

1.3 QUALITY ASSURANCE

- A. Codes and Standards: Comply with provisions of following, except otherwise indicated:
 - 1. References to "Form 818" means the State of Connecticut Department of Transportation "Standard Specification for Roads, Bridges and Incidental Construction, 2020", including any interim and supplemental specifications.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 CONSTRUCTION METHODS

- A. Comply with Section 2.09.03 of "Form 818" and as modified herein.
- B. In areas where unsuitable material has been removed, the existing ground shall be compacted prior to the placement of compacted granular fill.
- C. After all grading has been substantially completed and all underground work complete, the subgrade material shall be brought to the required lines and grades.
- D. All soft and yielding material and other portions of the subgrade which will not compact readily shall be removed and replaced with approved Compacted Granular Fill.
- E. Compact subgrade with approved power roller vibratory roller or compactor. The dry density of all areas after compaction shall not be less than 95 percent. After compaction, the top surface of

the subgrade shall be fine graded to within 2 inches of the required elevation. Permit proper drainage.

- F. Protect the completed subgrade from damage until any foundation or surfacing materials is placed thereon.

END OF SECTION

SECTION 02275

EROSION AND SEDIMENTATION CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contract Drawings, General Conditions and Supplementary General Conditions apply to this Section of the Specifications.

1.2 SUMMARY

- A. The work of this Section consists of furnishing, placing, maintaining and removal of erosion and sedimentation control systems at the location and detail shown on the Contract Drawings or as directed by the Owner's Representative, and in conformity with the specifications.

1.3 QUALITY ASSURANCE

- A. Codes and Standards: Comply with provisions of following, except otherwise indicated:
 - 1. References to "Form 818" means the State of Connecticut Department of Transportation "Standard Specification for Roads, Bridges and Incidental Construction, 2020", including any interim and supplemental specifications.
 - 2. References to "Connecticut Guidelines for Soil Erosion and Sedimentation Control" (2002).
 - 3. State of Connecticut, Department of Transportation, Best Management Practices for the Protection of the Environment.

1.4 SUBMITTALS

- A. Submit erosion and sedimentation control plans in conformance with Article 2.10.01 of "Form 818".

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Materials for this work shall conform to the requirements of Article 2.10.02, 2.18.02 and 2.19.02 of "Form 818".

PART 3 - EXECUTION

3.1 CONSTRUCTION METHODS

- A. Construction methods shall conform to the requirements of Article 2.10.03, 2.18.03 and 2.19.03 of "Form 818".

END OF SECTION

SECTION 02500

BITUMINOUS CONCRETE PAVEMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contract Drawings, General Conditions and Supplementary General Conditions apply to this Section of the Specifications.

1.2 SUMMARY

- A. The work under this Section shall consist of bituminous concrete placed upon a completed processed aggregate base course or upon the surface of an existing pavement. The work shall be installed in accordance with the line, grade, compacted thickness and details shown on the Contract Drawings.
- B. The work shall include, but not limited to the following:
 - 1. New pavement.
 - 2. Pavement overlay.
 - 3. Permanent pavement repair.

1.3 QUALITY ASSURANCE

- A. Codes and Standards: Comply with provisions of following, except otherwise indicated:
 - 1. References to "Form 818" means the State of Connecticut Department of Transportation "Standard Specification for Roads, Bridges and Incidental Construction, 2020", including any interim and supplemental specifications.

1.4 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections:
- B. Submit Material Certificates of Bituminous Mixture (Class) and Tack Coat signed by material producer and Contractor, certifying that each material item complies with or exceeds specified requirements.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Bituminous Concrete Pavement:

1. Material for Bituminous Concrete Pavement and Bituminous Bases shall comply with Section M.04 of "Form 818".
2. The class of bituminous and compacted thickness shall be as indicated on the Drawings.

PART 3 - EXECUTION

3.1 CONSTRUCTION METHODS

- A. Bituminous Concrete for Pavement shall comply with Article 4.06.03 of "Form 818".

END OF SECTION

SECTION 02514
BITUMINOUS TACK COAT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contract Drawings, General Conditions and Supplementary General Conditions apply to this Section of the Specifications.

1.2 SUMMARY

- A. The work under this Section shall consist of preparing and treating an existing surface with a thin application of bituminous material in order to satisfactorily bond the old and new work in accordance with these specifications and as directed by the Owner's Representative.

1.3 QUALITY ASSURANCE

- A. Codes and Standards: Comply with provisions of following, except otherwise indicated:
 - 1. References to "Form 818" means the State of Connecticut Department of Transportation "Standard Specification for Roads, Bridges and Incidental Construction, 2020", including any interim and supplemental specifications.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Unless otherwise indicated on the Contract Drawings, the bituminous material for this work shall conform to the requirements of M.04.01 of Form 818 for Grade RS-I Emulsified Asphalt. Applications temperature shall be between a minimum of 75 °F and a maximum 140°F.
- B. The bituminous material shall be diluted with an equal amount of suitable emulsifier solution and thoroughly mixed into a homogeneous liquid.

PART 3 - EXECUTION

3.1 CONSTRUCTION METHODS

- A. Weather Limitations - The tack coat shall be applied only when the existing surface is dry, when the atmospheric temperature is above 60°F, and when the weather is not foggy or rainy. The temperature requirements may be waived, but only when approved by the Owner's Representative.

- B. Equipment - The equipment used by the Contractor shall include a self-powered pressure bituminous material distributor and equipment for heating bituminous material.
1. The distributor shall have pneumatic tires and it shall be designed, equipped, and operated so that bituminous material at even heat may be applied uniformly on variable widths of surface at readily controlled rates from 0.05 to 2.0 gallons per square yard. The material shall be applied within a pressure range of 25 to 75 pounds per square inch and with an allowable variation from any specified rate not to exceed 5%. Distributor equipment shall include a tachometer, pressure gauges, volume-measuring devices, and a thermometer for reading temperatures of tank contents. Distributors shall be equipped with a power unit for the pump, and full circulation spray bars adjustable laterally and vertically. Distributors shall be equipped with an approved bituminous material sampling valve. When samples are taken through such valves, they shall be considered representative of all material in the tank.
 2. Smaller power spray units or hand spray equipment may be used in areas where the Owner's Representative determines that the use of a distributor is impractical.
- C. Preparation of Surface To Be Treated - The existing surface shall be patched and cleaned to provide a reasonably smooth and uniform surface to receive the treatment. Unstable corrugated areas shall be removed and replaced with patching materials, determined suitable by the Owner's Representative.
1. The edges of existing pavements, which are to be adjacent to new pavements, shall be cleaned to permit the adhesion of bituminous materials.
- D. Application of Bituminous Material - The bituminous material shall be applied using approved pressure distribution equipment in a manner to provide a uniform spray covering. The rate of application shall furnish a uniform asphalt residue on the original surface from 0.05 to 0.07 gallon per square yard of bituminous material (0.10 to 0.15 gallon per square yard of diluted material) within the specified temperature range.
1. All uncoated or lightly coated areas shall be satisfactorily corrected. All areas showing an excess of bituminous material shall be corrected with a covering of sufficient dry sand to effectively blot up or remove the excess tack coat material.
 2. Following the application, the surface shall be allowed to cure without being disturbed for such period of time as may be necessary to permit drying out and setting of the tack coat. This period shall be determined by the Owner's Representative.
 3. No more area shall be tack coated than can be properly cured and covered with the new surface within the same day.
- E. Protection of Treated Surfaces - The surface shall be maintained by the Contractor until the next course has been placed. Suitable precautions shall be taken by the Contractor to protect the surface against damage during this interval.

END OF SECTION

SECTION 02526

BITUMINOUS CONCRETE LIP CURBING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Contract, including General and Supplemental Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Bituminous concrete lip curbing shall consist of machine laid bituminous concrete, constructed on the pavement to the dimensions and details shown on the Plans, or as ordered, and in conformity with the Specifications.

1.3 QUALITY ASSURANCE

- A. Codes and Standards: Comply with provisions of following, except otherwise indicated:
 - 1. References to "Form 818" means the State of Connecticut Department of Transportation "Standard Specification for Roads, Bridges and Incidental Construction, 2020", including any interim and supplemental specifications.

1.4 SUBMITTALS

- A. Submit certification of bituminous mixture (class) and tack coat to the Engineer.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Materials for this work, including tack coats, shall conform to the requirements of Section M.04.02-1, of "Form 818".

PART 3 - EXECUTION

3.1 CONSTRUCTION METHODS

- A. Construction methods shall conform to the requirements of Article 8.15.03 of "Form 818".

END OF SECTION

SECTION 02831

CHAIN LINK FENCES AND GATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contract Drawings, General Conditions and Supplementary General Conditions apply to this Section of the Specifications.

1.2 SUMMARY

- A. The work under this Item shall consist of furnishing and installing chain link fence of the type specified herein, unless otherwise indicated on the Contract Drawings, and at the locations shown on the Contract Drawings in conformance with this Specification.

1.3 QUALITY ASSURANCE

- A. A.Codes and Standards: Comply with provisions of following, except otherwise indicated:
 - 1. 1. References to "Form 818" means the State of Connecticut Department of Transportation "Standard Specification for Roads, Bridges and Incidental Construction, 2020", including any interim and supplemental specifications.

1.4 SUBMITTALS

- A. Shop drawings: Layout of fences and gates with dimensions, details, and finishes of components, accessories, and post foundations.
- B. Product data: Manufacturer's catalog cuts indicating material compliance and specified options.
- C. Samples: Color selection for polyolefin finishes. Samples of materials (e.g., fabric, wires, and accessories).

1.5 MANUFACTURER

- A. Products from qualified manufacturers having a minimum of five years' experience manufacturing thermally fused chain link fencing will be acceptable by the architect as equal, if approved in writing, ten days prior to bidding, and if they meet the following specifications for design, size gauge of metal parts and fabrication.
- B. Obtain chain link fences and gates, including accessories, fittings, and fastenings, from a single source.

PART 2 - PRODUCTS

2.1 MATERIALS

2.2 CHAIN LINK FENCE FABRIC

- A. Polyolefin elastomer coating, 6 mil (0.15mm) to 10 mil (0.25mm) thickness, thermally fused to zinc-coated steel core wire: Per ASTM F668 Class 2b. Core wire tensile strength 75,000 psi (517 MPa).
- B. Size: Helically wound and woven to a height as indicated on drawings with 1 inch (25mm) diamond mesh, 11 gauge, with a core wire diameter of 0.120 inch (3.05mm) and a minimum breaking strength of 850 lbf (3780 N). Color Black ASTM F 934.
- C. Selvage of fabric knuckled at top and at knuckled at the bottom.

2.3 STEEL FENCE FRAMING

- A. Steel pipe - Type I: ASTM F 1083, standard weight schedule 40; minimum yield strength of 25,000 psi (170 MPa); sizes as indicated. Hot-dipped galvanized with minimum average 1.8 oz/ft² (550 g/m²) of coated surface area.
- B. Steel pipe - Type II: Cold formed and welded steel pipe complying with ASTM F 1043, Group IC, with minimum yield strength of 50,000 psi (344 MPa), sizes as indicated. Protective coating per ASTM F 1043, external coating Type B, zinc with organic overcoat, 0.9 oz/ft² (275 g/m²) minimum zinc coating with chromate conversion coating and verifiable polymer film. Internal coating Type B, minimum 0.9 oz/ft² (275 g/m²) zinc or Type D, zinc pigmented, 81 % nominal coating, minimum 3 mils (0.08 mm) thick.
- C. Formed steel ("C") sections: Roll formed steel shapes complying with ASTM F 1043, Group II, produced from 45,000 psi (310 MPa) yield strength steel; sizes as indicated. External coating per ASTM F 1043, Type A, minimum average 2.0 oz/ft² (610 g/m²) of zinc per ASTM A 123, or 4.0 oz/ft² (1220 g/m²) per ASTM A 525.
- D. Steel square sections: [ASTM A 500, Grade B] Steel having minimum yield strength of 40,000 psi (275 MPa); sizes as indicated. Hot-dipped galvanized with minimum 1.8 oz/ft² (550 g/m²) of coated surface area.
- E. Polyolefin Coated finish: In accordance with ASTM F 1043, apply supplemental color coating of minimum 10 mils (0.254mm) of thermally fused polyolefin in Black color to match fabric.
- F. For 6 ft to 8ft high fence,
 - 1. End and Corner Post 2.875 inches outside diameter (73.0 mm), 9.11 lbs/ft (13.6 kg/m)
 - 2. Line (intermediate) Post 2.375 inches outside diameter (60.3 mm), 3.65 lbs/ft (5.4 kg/m)
 - 3. Rail and Braces 1.66 inches outside diameter (42.2 mm), 2.27 lbs/ft (3.40 kg/m)
- G. Barbed wire top: Incorporate provisions for barbed extensions by extending vertical members 13" (380 mm) to accommodate three strands of barbed wire.

2.4 POLYOLEFIN COATED ACCESSORIES

- A. Chain link fence accessories: [ASTM F 626] Provide items required to complete fence system. Galvanize each ferrous metal item and finish to match framing.
- B. Post caps: Formed steel, cast malleable iron, or aluminum alloy weathertight closure cap for tubular posts. Provide one cap for each post. Cap to have provision for barbed wire when necessary. "C" shaped line post without top rail or barbed wire supporting arms do not require post caps. (Where top rail is used, provide tops to permit passage of top rail.)
- C. Top rail and brace rail ends: Pressed steel per ASTM F 626, for connection of rail and brace to terminal posts.
- D. Top rail sleeves: 7" (178 mm) expansion sleeve with spring, allowing for expansion and contraction of top rail.
- E. Wire ties: 9 gauge [0.148" (3.76 mm)] galvanized steel wire for attachment of fabric to line posts. Double wrap 13 gauge [0.092" (2.324 mm)] for rails and braces. Hogring ties of 12-1/2 gauge [0.0985" (2.502 mm)] for attachment of fabric to tension wire.
- F. Brace and tension (stretcher bar) bands: Pressed steel. At square post provide tension bar clips.
- G. Tension (stretcher) bars: One-piece lengths equal to 2 inches (50 mm) less than full height of fabric with a minimum cross-section of 3/16" x 3/4" (4.76 mm x 19 mm) or equivalent fiber glass rod. Provide tension (stretcher) bars where chain link fabric meets terminal posts.
- H. Tension wire: Thermally fused polyolefin applied to metallic coated steel wire: Per ASTM F 1664 Class 2 b, 6 gauge, [0.192" (4.88 mm)] diameter core wire with tensile strength of 75,000 psi (517 MPa).
- I. Truss rods & tightener: Steel rods with minimum diameter of 5/16" (7.9 mm). Capable of withstanding a tension of minimum 2,000 lbs.
- J. Barbed wire: Thermally fused polyolefin coated per ASTM F 1665 Class 2b steel wire double strand, 13-3/4 gauge, [0.083" (2.10 mm)] twisted line wire with galvanized steel, 4 point barbs (without polyolefin finish) spaced approximately 3" (76.2 mm) on center.
- K. Barbed wire supporting arms: Pressed steel arms with provisions for attaching 3 rows of barbed wire. Arms shall withstand 250 lb. (113.5 kg) downward pull at outermost end of arm without failure.
 - 1. Provide 45° 3 strands, single arm and 6 strands double "V" arms.
 - 2. Provide intermediate arms with hole for passage of top rail.
- L. L. Nuts and bolts are galvanized but not polyolefin coated. Cans of touch up paint are available to color coat nuts and bolts if desired. Standard —PDS (self-locking using horizontal bottom channel system) (see fence detail)

2.5 SETTING MATERIALS

- A. Concrete: Minimum 28 day compressive strength of 3,000 psi (20 MPa).

OR

- B. Drive Anchors: Galvanized angles, ASTM A 36 steel 1 " x 1" x 30" (25 mm x 25 mm x 762 mm) galvanized shoe clamps to secure angles to posts.

PART 3 - EXECUTION

3.1 CONSTRUCTION METHODS

3.2 EXAMINATION

- A. Verify areas to receive fencing are completed to final grades and elevations.
- B. Ensure property lines and legal boundaries of work are clearly established.

3.3 CHAIN LINK FENCE FRAMING INSTALLATION

- A. Install chain link fence in accordance with ASTM F 567 and manufacturer's instructions.
- B. Locate terminal post at each fence termination and change in horizontal or vertical direction of 30° or more.
- C. Space line posts uniformly at 8' (2438 mm) on center.
- D. Concrete set terminal posts: Drill holes in firm, undisturbed or compacted soil. Holes shall have diameter 4 times greater than outside dimension of post, and depths approximately 6" (152 mm) deeper than post bottom. Excavate deeper as required for adequate support in soft and loose soils, and for posts with heavy lateral loads. Set post bottom 36" (914 mm) below surface when in firm, undisturbed soil. Place concrete around posts in a continuous pour. Trowel finish around post. Slope to direct water away from posts.
- E. Drive Anchor line posts: With protective cap, drive post 36" (914 mm) into ground. Slightly below ground level install drive anchor shoe fitting. Install 2 diagonal drive anchors and tighten in the shoe.
- F. Check each post for vertical and top alignment and maintain in position during placement and finishing operations.
- G. Bracing: Install horizontal pipe brace at mid-height for fences 6' (1829 mm) and over, on each side of terminal posts. Firmly attach with fittings. Install diagonal truss rods at these points. Adjust truss rod, ensuring posts remain plumb.
- H. Tension wire: Provide tension wire at bottom of fabric and at top. Install tension wire before stretching fabric and attach to each post with ties. Secure tension wire to fabric with 12-1/2 gauge hog rings 24" (610 mm) oc.

- I. Top rail: Install lengths, 21 ' (6400 mm). Connect joints with sleeves for rigid connections for expansion/contraction.
- J. Center Rails (for fabric height 12' (3658 mm) and over). Install mid rails between posts with fittings and accessories.
- K. Bottom Rails: Install bottom rails between posts with fittings and accessories.

3.4 CHAIN LINK FABRIC INSTALLATION

- A. Fabric: Install fabric on security side and attach so that fabric remains in tension after pulling force is released. Leave approximately 2" (50 mm) between finish grade and bottom selvage. Attach fabric with wire ties to line posts at 15" (381 mm) on center and to rails, braces, and tension wire at 24" (600 mm) on center.
- B. Tension (stretcher) bars: Pull fabric taut; thread tension bar through fabric and attach to terminal posts with bands or clips spaced maximum of 15" (381 mm) on center.

3.5 ACCESSORIES

- A. Tie wires: Bend ends of wire to minimize hazard to persons and clothing.
- B. Fasteners: Install nuts on side offence opposite fabric side for added security.
- C. Barbed wire: Uniformly space parallel rows of barbed wire on security side of fence. Pull wire taut and attach in clips or slots of each extension.

3.6 CLEANING

- A. Clean up debris and unused material and remove from the site.

END OF SECTION

SECTION 02936
TURF ESTABLISHMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contract Drawings, General Conditions and Supplementary General Conditions apply to this Section of the Specifications.

1.2 SUMMARY

- A. Scarify all proposed topsoil/grass areas.
- B. Furnish and install 4" of topsoil and required soil supplements based on topsoil tests.
- C. Seeding by hydroseeding or sod placement (Contractor's option). All disturbed areas shall be seeded.
- D. Mulching and protection of all seeded areas.
- E. Maintaining seeded areas until acceptance by the Engineer.

1.3 QUALITY ASSURANCE

- A. Codes and Standards: Comply with provisions of following, except otherwise indicated:
 - 1. References to "Form 818" means the State of Connecticut Department of Transportation "Standard Specification for Roads, Bridges and Incidental Construction, 2020", including any interim and supplemental specifications.

1.4 TESTS

- A. The Contractor shall take representative samples of the loam/ topsoil stripped and stockpiled for reuse. The topsoil samples shall be sent to an approved agricultural soil testing laboratory to determine PH rating, classification, humus and nutrient levels of the soil. Recommendations shall be made by the testing laboratory for required soil supplements in order to achieve agronomically acceptable nutrient levels for the type of lawn or crop to be established.
- B. The cost of the soil tests and installation of the recommended soil supplements are to be borne by the Contractor.

1.5 SUBMITTALS

- A. Submit certified loam testing reports to the Engineer for review and approval of required soil supplements.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Comply with Article M.13 of "Form 818" and as modified herein.

2.2 SOIL SUPPLEMENTS

- A. Fertilizer shall be standard quality commercial type with 50 percent of the elements nitrogen (N), phosphorus (P) and potash (K), derived from organic sources.
- B. Agricultural ground dolomitic limestone used to raise the pH level shall conform to the Association of Official Agricultural Chemists and must comply with State and Federal Regulations. The minimum calcium carbonate equivalent shall be 90 percent.
- C. Aluminum sulfate shall be unadulterated commercial or flour sulphur. Add aluminum sulfate to a rate of 2-1/2 pounds per cubic yard of topsoil to lower the pH one full point unless otherwise recommended by manufacturer.
- D. Application rates of the Soil Supplements shall be per the recommendations of the soil testing laboratory.

2.3 SEED MIXTURE AND APPLICATION RATE

- A. Type 1 – Sunny Lawn Mixture (Fine Textured)

Name	% by Weight	Purity	Minimum Germination
Manhattan Perennial Ryegrass	25	95	90
Marion Kentucky Bluegrass	25	98	80
Penlawn Red Fescue	20	98	90
Chewings Red Fescue	20	95	90
Kentucky Bluegrass	10	90	80

Application rate shall be 5 pounds per 1000 square feet.

2.4 ACCESSORIES

- A. Mulching material for grass seed areas shall be oat or wheat straw or hay.
- B. Water shall be potable.
- C. The incident for treating leguminous seed shall be a standard commercial product consisting of a suitable carrier containing a culture of nitrogen fixing bacteria specific for the specific seed

variety to be inoculated. All containers must remain sealed until contents are used in their entirety. Inoculant shall not be used after the expiration date indicated on the container. Suitable storage in a moderate temperature shall be provided at all times. All inoculants shall be subject to approval of the Engineer.

PART 3 - EXECUTION

3.1 GENERAL

- A. Comply with Section 9.44.03 and 9.50.03 of "Form 818" and as modified herein.

3.2 SCARIFY AND PREPARATION OF SEEDBED

- A. After placement of topsoil to the depth shown on the Drawings, prepare the seedbed by discing or scarifying to a minimum depth of 4 inch.
- B. Apply recommended soil supplements required by the topsoil analysis and work into the top 2 inches.
- C. Rake, prepare the seedbed and fine grade to the limits and grades shown on the Drawings.

3.3 SEEDING SEASON

- A. The calendar dates for seeding shall be:
 - 1. Spring: March 15 to June 15
 - 2. Fall: August 15 to October 15

3.4 SEEDING METHODS

- A. The grass seed mixture shall be applied by an agronomically acceptable procedure.
- B. Roll seeded area with roller not exceeding 112 pounds.
- C. Apply water with fine spray immediately after each area has been sown.

3.5 SEED PROTECTION ON SLOPES

- A. Cover seeded drainage swales and slopes where grade is 3:1 or greater with straw or hay.

3.6 MAINTENANCE PERIOD

- A. Maintain seeded area until final acceptance, until the project is turned over to the Owner, and/or until such time as at least two mowings have been done on the fully established lawn/grass areas, whichever is greater.

3.7 MAINTENANCE REQUIRED UNTIL ACCEPTANCE

- A. Maintain surfaces and supply additional topsoil where necessary, including areas affected by erosion. Reapply mulch to protect restored areas.
- B. Water to ensure uniform seed germination and to keep surface of soil damp.
- C. Apply water slowly so that surface of soil will not puddle and crust.
- D. Rake up and remove all straw or hay mulch prior to first cutting.
- E. Cut grass first time when it reaches height of 2-1/2 inches (60 mm) and maintain to minimum height of 2 inches (50 mm). Do not cut more than 1/3 of blade at any one mowing. Remove clippings.
- F. After first mowing, water grass sufficient to moisten soil from 3 inches to 5 inches (76 to 127 mm) deep.
- G. Apply weed killer when weeds start developing, during calm weather when air temperature is above 50 degrees F (10 degrees C).
- H. Replant damaged grass areas showing root growth failure, deterioration, bare or thin spots, and eroded areas.

3.8 RESTORATION

- A. Restore all damaged areas as many times as necessary until turf is satisfactorily established.

3.9 ACCEPTANCE

- A. Seeded areas will be accepted at end of maintenance period when seeded areas are properly established and otherwise acceptable.

END OF SECTION

DIVISION 03
CONCRETE

SECTION 03300
CAST-IN-PLACE CONCRETE

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 cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:
 - 1. Footings.
 - 2. Foundation walls.
 - 3. Slabs-on-grade.
 - 4. Aprons.
 - 5. Suspended slabs.
 - 6. Building walls.
- B. Related Sections:
 - 1. Division 2 Section "Excavation, Backfilling and Compaction" for drainage fill under slabs-on-grade.
 - 2. Division 2 Section "Compacted Granular Fill" for structural foundations.
 - 3. Division 9 Section "High Performance Coatings" for protection of concrete surfaces.

1.3 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.

1.4 ACTION 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. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
 - 1. Location of construction joints is subject to approval of the Engineer.
- F. Samples: For waterstops and vapor retarder

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer, manufacturer, and testing agency.
- B. Welding certificates.
- C. 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. Floor and slab treatments.
 - 8. Bonding agents.
 - 9. Adhesives.
 - 10. Vapor retarders.
 - 11. Semirigid joint filler.
 - 12. Joint-filler strips.
 - 13. Repair materials.
- D. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:
 - 1. Aggregates. Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.
- E. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.
- F. Field quality-control reports.

- G. Minutes of pre-installation conference.

1.6 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-I 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. **Welding Qualifications:** Qualify procedures and personnel according to AWS DI.4/D 1.4M, "Structural Welding Code - Reinforcing Steel. "
- F. **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."
- G. **Concrete Testing Service:** Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.
- H. **Mockups:** Cast concrete slab-on-grade panels to demonstrate typical joints, surface finish, texture, tolerances, floor treatments, and standard of workmanship.
 - 1. Build panel approximately 200 sq. ft. for slab-on-grade in the location indicated or, if not indicated, as directed by Architect.
 - 2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

- I. Pre-installation Conference: Conduct conference at 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.
 - e. Special concrete finish subcontractor.
 2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, semirigid joint fillers, forms and form removal limitations, shoring and reshoring procedures, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, floor and slab flatness and levelness measurement, concrete repair procedures, and concrete protection.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage. Avoid damaging coatings on steel reinforcement.
- B. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

PART 2 - PRODUCTS

2.1 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. 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. Void Forms: Biodegradable paper surface, treated for moisture resistance, structurally sufficient to support weight of plastic concrete and other superimposed loads.
- D. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch (19 by 19 mm), minimum.

- E. 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.
 - 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
- F. 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 (25 mm) to the plane of exposed concrete surface.
 - 2. Furnish ties that, when removed, will leave holes no larger than 1 inch (25 mm) in diameter in concrete surface.
 - 3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

2.2 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.
- B. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, plain, fabricated from as-drawn steel wire into flat sheets.
- C. Deformed-Steel Welded Wire Reinforcement: ASTM A 497/A 497M, flat sheet.

2.3 REINFORCEMENT ACCESSORIES

- A. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), 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.

2.4 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 1/11, gray. Supplement with the following:
 - a. Fly Ash: ASTM C 618, Class F.
 - b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

- B. Silica Fume: ASTM C 1240, amorphous silica.
- C. Normal-Weight Aggregates: ASTM C 33, Class 4S coarse aggregate or better, graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.
 - 1. Maximum Coarse-Aggregate Size: 1 inch (25 mm) nominal.
 - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- D. Water: ASTM C 94/C 94M and potable.

2.5 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.
- C. Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete and complying with ASTM C 494/C 494M, Type C.
 - 1. Products: Subject to compliance with requirements.
- D. Non-Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, non-set-accelerating, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete.
 - 1. Products: Subject to compliance with requirements

2.6 WATERSTOPS

- A. Chemically Resistant Flexible Waterstops: Thermoplastic elastomer rubber waterstops with factory-installed metal eyelets, for embedding in concrete to prevent passage of fluids through joints; resistant to oils, solvents, and chemicals. Factory fabricate corners, intersections, and directional changes.
 - 1. Products: Subject to compliance with requirements.
 - 2. Profile: Ribbed with center bulb
 - 3. Dimensions: 6 inches by 3/16 inch thick (150 mm by 4.75 mm thick)]; nontapered.

2.7 VAPOR RETARDERS

- A. Sheet Vapor Retarder: ASTM E 1745, Class A, not less than ten mils thick. Include manufacturer's recommended adhesive or pressure-sensitive tape.
 - 1. Products: Subject to compliance with requirements.
- B. Granular Fill: Clean mixture of crushed stone or crushed or uncrushed gravel; ASTM D 448, Size 57, with 100 percent passing a 1-1/2-inch (37.5-mm) sieve and 0 to 5 percent passing a No. 8 (2.36-mm) sieve.

2.8 LIQUID FLOOR TREATMENTS

- A. VOC Content: Liquid floor treatments shall have a VOC content of 200 g/L OF less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- B. Penetrating Liquid Floor Treatment: Clear chemically reactive, waterborne _solution of inorganic silicate or silicate materials and proprietary components; odorless; that penetrates, hardens, and densifies concrete surfaces.
 - 1. Products: Subject to compliance with requirements.

2.9 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
 - 1. Products: Subject to compliance with requirements.
- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) when dry.
- C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- D. Water: Potable.
- E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.
 - 1. Products: Subject to compliance with requirements.

2.10 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.
- B. Bonding Agent: ASTM C 1059/C 1059M, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

- C. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:
 - 1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.
- D. Reglets: Fabricate reglets of not less than 0.022-inch- (0.55-mm-) thick, galvanized-steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.
- E. Dovetail Anchor Slots: Hot-dip galvanized-steel sheet, not less than 0.034 inch (0.85 mm) thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

2.11 REPAIR MATERIALS

- A. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch (6.4 mm) 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 (3.2 to 6 mm) or coarse sand as recommended by topping manufacturer.
 - 4. Compressive Strength: Not less than 5000 psi (34.5 MPa) at 28 days when tested according to ASTM C 109/C 109M.
- B. Screening Channel: Repair materials for vertical and horizontal concrete surfaces of screening channel and channel divider:
 - 1. See Section 03732: Concrete Repair.

2.12 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: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
 - 1. Fly Ash: 25 percent.
 - 2. Combined Fly Ash and Pozzolan: 25 percent.
 - 3. Ground Granulated Blast-Furnace Slag: 50 percent.

4. Combined Fly Ash or Pozzolan and Ground Granulated Blast-Furnace Slag: 50 percent portland cement minimum, with fly ash or pozzolan not exceeding 25 percent.
 5. Silica Fume: 10 percent.
 6. Combined Fly Ash, Pozzolans, and Silica Fume: 35 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.
 7. Combined Fly Ash or Pozzolans, Ground Granulated Blast-Furnace Slag, and Silica Fume: 50 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.
- C. Limit water-soluble, chloride-ion content in hardened concrete to 0.06 percent by weight of cement.
- D. Admixtures: Use admixtures according to manufacturer's written instructions.
1. Use 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.
- E. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.

2.13 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. Footings: Proportion normal-weight concrete mixture as follows:
1. Minimum Compressive Strength: 4000 psi (27.6 MPa) at 28 days.
 2. Maximum Water-Cementitious Materials Ratio: 0.45 .
 3. Slump Limit: 4 inches (100 mm) for concrete with verified slump of 2 to 4 inches (50 to 100 mm) before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch (25 mm).
 4. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for I-inch (25-mm) nominal maximum aggregate size.
- B. Foundation Walls and Building Walls: Proportion normal-weight concrete mixture as follows:
1. Minimum Compressive Strength: 4000 psi (27.6 MPa) at 28 days.
 2. Maximum Water-Cementitious Materials Ratio: 0.45 .
 3. Slump Limit: 4 inches (100 mm) for concrete with verified slump of 2 to 4 inches (50 to 100 mm) before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch (25 mm).
 4. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for I-inch (25-mm) nominal maximum aggregate size.
- C. Slabs-on-Grade: Proportion normal-weight concrete mixture as follows:
1. Minimum Compressive Strength: 4000 psi (27.6 MPa) at 28 days.

2. Minimum Cementitious Materials Content: 540 lb/cu. yd. (320 kg/cu. m).
3. Slump Limit: 4 inches (100 mm), plus or minus 1 inch (25 mm).
4. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for I-inch (25-mm) nominal maximum aggregate size.
5. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.

D. Suspended Slabs: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 4000 psi (27.6 MPa) at 28 days.
2. Minimum Cementitious Materials Content: 540 lb/cu. yd. (320 kg/cu. m).
3. Slump Limit: 4 inches (100 mm), plus or minus 1 inch (25 mm).
4. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for I-inch (25-mm) nominal maximum aggregate size.
5. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.

2.14 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice. "

2.15 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 (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK

- 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 A, 1/8 inch (3.2 mm) for smooth-formed finished surfaces.
 2. Class B, 1/4 inch (6 mm) for rough-formed finished surfaces.
- 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.

3.2 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. "
 - 2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
 - 3. Install dovetail anchor slots in concrete structures as indicated.

3.3 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 (10 deg C) 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 Architect.

3.4 SHORES AND RESHORES

- A. Comply with ACI 318 (ACI 318M) 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.

3.5 VAPOR RETARDERS

- A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.
1. Lap joints 6 inches (150 mm) and seal with manufacturer's recommended tape.

3.6 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
- 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 DI.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.

3.7 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 Architect.
 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 (38 mm) 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. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
 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 (3.2 mm). 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- (3.2-mm-) wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
- D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
 1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.
 2. Terminate full-width joint-filler strips not less than 1/2 inch (13 mm) or more than 1 inch (25 mm) below finished concrete surface where joint sealants, specified in Section 079200 "Joint Sealants," are indicated.

3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.
- E. 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.

3.8 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.

3.9 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. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.
- C. 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 (150 mm) 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.
- D. 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 staffing finishing operations.

- E. 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 (4.4 deg C) 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.
- F. Hot-Weather Placement: Comply with ACI 301 and as follows:
1. Maintain concrete temperature below 90 deg F (32 deg C) 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.

3.10 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, to receive a rubbed finish.
- C. Rubbed Finish: Apply the following to smooth-formed finished as-cast concrete where indicated:
1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
 2. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix one part portland cement to one and one-half parts fine sand with a 1:1 mixture of bonding admixture and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, 111b surface with clean burlap and keep surface damp by fog spray for at least 36 hours.
 3. Cork-Floated Finish: Wet concrete surfaces and apply a stiff grout. Mix one part portland cement and one part fine sand with a mixture of bonding agent and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match

adjacent surfaces. Compress grout into voids by grinding surface. In a swirling motion, finish surface with a cork float.

- D. 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.

3.11 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302. IR 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 bullfloated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch (6 mm) in one direction.
 - 1. Apply scratch finish to surfaces indicated.
- 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 indicated to receive trowel finish and to be covered with fluid-applied or sheet waterproofing.
- 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 exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
 - 2. Finish surfaces to the following tolerances, according to ASTM E 1155 (ASTM E 1155M), for a randomly trafficked floor surface:
 - a. Specified overall values of flatness, F(F) 35; and of levelness, F(L) 25; with minimum local values of flatness, F(F) 24; and of levelness, F(L) 17; for slabs-on-grade.
- E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces indicated. While concrete is still plastic, slightly scarify surface with a fine broom.
 - 1. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.

3.12 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: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing machines and equipment.

3.13 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 (1 kg/sq. m 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 (300-mm) 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 (300 mm), 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 penetrating liquid floor treatments.
 - 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.14 LIQUID FLOOR TREATMENTS

- A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment according to manufacturer's written instructions.
 1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
 2. Do not apply to concrete that is less than the number of days' old required by the manufacturer's instructions.
 3. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing. Rinse with water; remove excess material until surface is dry. Apply a second coat in a similar manner if surface is rough or porous.

3.15 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 [one] [six] month(s). 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.
- C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches (50 mm) deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.16 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect'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 (1.18-mm) 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 (13 mm) in any dimension to solid concrete. Limit cut depth to 3/4 inch (19 mm). 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 Architect.
- 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 (0.25 mm) 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 (6 mm) 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 (25 mm) 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 (19-mm) 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 (25 mm) 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 Architect's approval, using epoxy adhesive and patching mortar.
- F. Repair materials and installation not specified above may be used, subject to Architect's approval.
- G. Screening Channel: For additional requirements related to repair of vertical and horizontal concrete surfaces of screening channel and channel divider:
1. See Section 03732: Concrete Repair.

3.17 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

- B. Inspections:
 - 1. Steel reinforcement placement.
 - 2. Steel reinforcement welding.
 - 3. Headed bolts and studs.
 - 4. Verification of use of required design mixture.
 - 5. Concrete placement, including conveying and depositing.
 - 6. Curing procedures and maintenance of curing temperature.
 - 7. 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 one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd. (4 cu. m), but less than 25 cu. yd. (19 cu. m), plus one set for each additional 50 cu. yd. (38 cu. m) or fraction thereof.
 - 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 (4.4 deg C) and below and when 80 deg F (27 deg C) 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.
 - b. Cast and field 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. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.

8. 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 (3.4 MPa).
 9. Test results shall be reported in writing to Architect, 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.
 10. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
 11. 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 Architect. 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 Architect.
 12. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
 13. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.
- D. Measure floor and slab flatness and levelness according to ASTM E 1155 (ASTM E 1155M) within 48 hours of finishing.

3.18 PROTECTION OF LIQUID FLOOR TREATMENTS

- A. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.

END OF SECTION

SECTION 03400
PRECAST CONCRETE STRUCTURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Precast structural concrete.

B. Related Sections:

- 1. Division 3 Section "Cast-in-Place Concrete" for placing connection anchors in concrete.
- 2. Division 4 Section "Concrete Unit Masonry Assemblies" for inserts or anchorages required for precast concrete slab connections.
- 3. Division 5 Section "Structural Steel Framing" for furnishing and installing connections attached to structural-steel framing.
- 4. Division 7 Section "Sheet Metal Flashing and Trim" for flashing receivers and reglets.

1.3 DEFINITION

- A. Design Reference Sample: Sample of approved precast structural concrete color, finish, and texture, preapproved by Architect.

1.4 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design precast structural concrete, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Structural Performance: Precast structural concrete units and connections shall withstand design loads indicated within limits and under conditions indicated.
 - 1. Design precast structural concrete framing system and connections to maintain clearances at openings, to allow for fabrication and construction tolerances, to accommodate liveload deflection, shrinkage and creep of primary building structure, and other building movements. Maintain precast structural concrete deflections within limits of ACI 318 (ACI 318M).

- a. Thermal Movements: Allow for in-plane thermal movements resulting from annual ambient temperature changes of minus 18 to plus 120 deg F (minus 10 to plus 67 deg C).
2. Fire-Resistance Rating: Select material and minimum thicknesses to provide indicated fire rating.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Design Mixtures: For each precast concrete mixture. Include compressive strength and water-absorption tests.
- C. Shop Drawings: Include member locations, plans, elevations, dimensions, shapes and sections, openings, support conditions, and types of reinforcement, including special reinforcement. Detail fabrication and installation of precast structural concrete units.
 1. Indicate joints, reveals, and extent and location of each surface finish.
 2. Indicate separate face and backup mixture locations and thicknesses.
 3. Indicate welded connections by AWS standard symbols. Show size, length, and type of each weld.
 4. Detail loose and cast-in hardware, lifting and erection inserts, connections, and joints.
 5. Indicate locations, tolerances, and details of anchorage devices to be embedded in or attached to structure or other construction.
 6. Include and locate openings larger than by 10 inches (250 mm).
 7. Indicate location of each precast structural concrete unit by same identification mark placed on panel.
 8. Indicate relationship of precast structural concrete units to adjacent materials.
 9. Indicate shim sizes and grouting sequence.
 10. Design Modifications: If design modifications are proposed to meet performance requirements and field conditions, submit design calculations and Shop Drawings. Do not adversely affect the appearance, durability, or strength of units when modifying details or materials and maintain the general design concept.
- D. Delegated-Design Submittal: For precast structural concrete indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer registered in the State of Connecticut and responsible for their preparation.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer, fabricator and testing agency.
- B. Welding certificates.
- C. Material Certificates: For the following, from manufacturer:
 1. Cementitious materials.

2. Reinforcing materials and prestressing tendons.
3. Admixtures.
4. Bearing pads.
5. Structural-steel shapes and hollow structural sections.

D. Material Test Reports: For aggregates.

E. Source quality-control reports.

F. Field quality-control reports.

1.7 QUALITY ASSURANCE

A. Fabricator Qualifications: A firm that assumes responsibility for engineering precast structural concrete units to comply with performance requirements. Responsibility includes preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.

1. Participates in PCI's Plant Certification program at time of bidding and is designated a PCI-certified plant as follows:

- a. Group C, Category C2 - Prestressed Hollowcore and Repetitively Produced Products.

B. Installer Qualifications: A precast concrete erector qualified at time of bidding, as evidenced by PCI's Certificate of Compliance, to erect Category SI - Simple Structural Systems.

C. Testing Agency Qualifications: Qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

D. Design Standards: Comply with ACI 318 (ACI 318M) and design recommendations in PCI MNL 120, "PCI Design Handbook - Precast and Prestressed Concrete, " applicable to types of precast structural concrete units indicated.

E. Quality-Control Standard: For manufacturing procedures and testing requirements, quality-control recommendations, and dimensional tolerances for types of units required, comply with PCI MNL 116, "Manual for Quality Control for Plants and Production of Structural Precast Concrete Products. "

F. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D.1.1M, "Structural Welding Code - Steel."
2. AWS D1.4, "Structural Welding Code - Reinforcing Steel."

G. Fire-Resistance Calculations: Where indicated, provide precast structural concrete units whose fire resistance meets the prescriptive requirements of authorities having jurisdiction or has been calculated according to ACI 216.1/TMS 0216.1, "Standard Method for Determining Fire Resistance of Concrete and Masonry Construction Assemblies", and is acceptable to authorities having jurisdiction.

H. Preinstallation Conference: Conduct conference at Project site.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Support units during shipment on non-staining shock-absorbing material in same position as during storage.
- B. Store units with adequate bracing and protect units to prevent contact with soil, to prevent staining, and to prevent cracking, distortion, warping or other physical damage.
 - 1. Store units with dunnage across full width of each bearing point unless otherwise indicated.
 - 2. Place adequate dunnage of even thickness between each unit.
 - 3. Place stored units so identification marks are clearly visible, and units can be inspected.
- C. Handle and transport units in a position consistent with their shape and design in order to avoid excessive stresses that would cause cracking or damage.
- D. Lift and support units only at designated points shown on Shop Drawings.

1.9 COORDINATION

- A. Furnish loose connection hardware and anchorage items to be embedded in or attached to other construction before starting that Work. Provide locations, setting diagrams, templates, instructions, and directions, as required, for installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Fabricators: Subject to compliance with requirements.

2.2 MOLD MATERIALS

- A. Molds: Rigid, dimensionally stable, non-absorptive material, warp and buckle free, that will provide continuous and true precast concrete surfaces within fabrication tolerances indicated; nonreactive with concrete and suitable for producing required finishes.
 - 1. Mold-Release Agent: Commercially produced liquid-release agent that will not bond with, stain or adversely affect precast concrete surfaces and will not impair subsequent surface or joint treatments of precast concrete.
- B. Form Liners: Units of face design, texture, arrangement, and configuration indicated. Furnish with manufacturer's recommended liquid-release agent that will not bond with, stain, or adversely affect precast concrete surfaces and will not impair subsequent surface or joint treatments of precast concrete.

2.3 REINFORCING MATERIALS

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- B. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.
- C. Plain-Steel Welded Wire Reinforcement: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.
- D. Deformed-Steel Welded Wire Reinforcement: ASTM A 497/A 497M, flat sheet.
- E. Supports: Suspend reinforcement from back of mold or use bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place according to PCI MNL 116.

2.4 PRESTRESSING TENDONS

- A. Pretensioning Strand: ASTM A 416/A 416M, Grade 250 (Grade 1720) or Grade 270 (Grade 1860), uncoated, 7-wire or ASTM A 886/A 886M, Grade 270 (Grade 1860), indented, 7-wire, low-relaxation strand.

2.5 CONCRETE MATERIALS

- A. Portland Cement: ASTM C 150, Type I or Type III, gray, unless otherwise indicated.
 - 1. 1. For surfaces exposed to view in finished structure, mix gray with white cement, of same type, brand, and mill source.
- B. Supplementary Cementitious Materials:
 - 1. Fly Ash: ASTM C 618, Class C or F, with maximum loss on ignition of 3 percent.
 - 2. Silica Fume Admixture: ASTM C 1240, with optional chemical and physical requirement.
 - 3. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
- C. Normal-Weight Aggregates: Except as modified by PCI MNL 116, ASTM C 33, with coarse aggregates complying with Class SS. Stockpile fine and coarse aggregates for each type of exposed finish from a single source (pit or quarry) for Project.
- D. Coloring Admixture: ASTM C 979, synthetic or natural mineral-oxide pigments or colored water-reducing admixtures, temperature stable, and nonfading.
- E. Water: Potable; free from deleterious material that may affect color stability, setting, or strength of concrete and complying with chemical limits of PCI MNL 116.
- F. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.
- G. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and to not contain calcium chloride, or more than 0.15 percent chloride ions or other salts by weight of admixture.

1. Water-Reducing Admixtures: 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. Water-Reducing and Accelerating Admixture: ASTM C 494/C 494M, Type E.
5. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
6. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
7. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M.

H. Corrosion-Inhibiting Admixture: Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete.

2.6 STEEL CONNECTION MATERIALS

- A. Carbon-Steel Shapes and Plates: ASTM A 36/A 36M.
- B. Carbon-steel-Headed Studs: ASTM A 108, AISI 1018 through AISI 1020, cold finished, AWS D1.1/DI.1M, Type A or B, with arc shields and with minimum mechanical properties of PCI MNL 116.
- C. High-strength, Low-Alloy Structural Steel: ASTM A 572/A 572M.
- D. Deformed-Steel Wire or Bar Anchors: ASTM A 496 or ASTM A 706/A 706M.
- E. Carbon-Steel Bolts and Studs: ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); carbon-steel, hex-head bolts and studs; carbon-steel nuts, ASTM A 563 (ASTM A 563M); and flat, unhardened steel washers, ASTM F 844.
- F. Zinc-Coated Finish: For exterior steel items and items indicated for galvanizing, apply zinc coating by hot-dip process according to ASTM A 123/A 123M or ASTM A 153/A 153M.
1. For steel shapes, plates, and tubing to be galvanized, limit silicon content of steel to less than 0.03 percent or to between 0.15 and 0.25 percent or limit sum of silicon and 2.5 times phosphorous content to 0.09 percent.
 2. Galvanizing Repair Paint: High-zinc-dust-content paint with dry film containing not less than 94 percent zinc dust by weight, and complying with DOD-P-21035B or SSPC Paint 20.
- G. Welding Electrodes: Comply with AWS standards.
- H. Precast Accessories: Provide clips, hangers, plastic or steel shims, and other accessories required to install precast structural concrete units.

2.7 STAINLESS-STEEL CONNECTION MATERIALS

- A. Stainless-Steel Plate: ASTM A 666, Type 304, of grade suitable for application.
- B. Stainless-Steel Bolts and Studs: ASTM F 593, Alloy 304 or 316, hex-head bolts and studs; stainless-steel nuts; and flat, stainless-steel washers. Lubricate threaded parts of stainless-steel bolts with an anti-seize thread lubricant during assembly.

- C. Stainless-Steel-Headed Studs: ASTM A 276, with minimum mechanical properties of PCI MNL 116.

2.8 BEARING PADS

- A. Provide one of the following bearing pads for precast structural concrete units as recommended by precast fabricator for application:
 - 1. Elastomeric Pads: AASHTO M 251, plain, vulcanized, 100 percent polychloroprene (neoprene) elastomer, molded to size or cut from a molded sheet, 50 to 70 Shore, Type A durometer hardness, ASTM D 2240; minimum tensile strength 2250 psi (15.5 MPa), ASTM D 412.
 - 2. Random-Oriented, Fiber-Reinforced Elastomeric Pads: Preformed, randomly oriented synthetic fibers set in elastomer. 70 to 90 Shore, Type A durometer hardness, ASTM D 2240; capable of supporting a compressive stress of 3000 psi (20.7 MPa) with no cracking, splitting, or delaminating in the internal portions of pad. Test 1 specimen for every 200 pads used in Project.
 - 3. Cotton-Duck-Fabric-Reinforced Elastomeric Pads: Preformed, horizontally layered cotton-duck fabric bonded to an elastomer; 80 to 100 Shore, Type A durometer hardness, ASTM D 2240; complying with AASHTO's "AASHTO Load and Resistance Factor Design (LRFD) Bridge Specifications," Division II, Section 18.10.2; or with MIL-C882E.
 - 4. Frictionless Pads: Tetrafluoroethylene, glass-fiber reinforced, bonded to stainless- or mild-steel plate, of type required for in-service stress.
 - 5. High-Density Plastic: Multi-monomer, non-leaching, plastic strip.

2.9 GROUT MATERIALS

- A. Sand-Cement Grout: Portland cement, ASTM C 150, Type I, and clean, natural sand,
- B. ASTM C 144 or ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.
- C. Nonmetallic, Non-shrink Grout: Premixed, nonmetallic, noncorrosive, non-staining grout containing selected silica sands, Portland cement, shrinkage-compensating agents, plasticizing and water-reducing agents, complying with ASTM C 1107, Grade A for drypack and Grades B and C for flowable grout and of consistency suitable for application within a 30-minute working time.

2.10 CONCRETE MIXTURES

- A. Prepare design mixtures for each type of precast concrete required.
 - 1. Use fly ash, pozzolan, ground granulated blast-furnace slag, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.
 - 2. Limit use of fly ash to 25 percent replacement of portland cement by weight and granulated blast-furnace slag to 40 percent of portland cement by weight; silica fume to 10 percent of portland cement by weight.

- B. Design mixtures may be prepared by a qualified independent testing agency or by qualified precast plant personnel at precast structural concrete fabricator's option.
- C. Limit water-soluble chloride ions to maximum percentage by weight of cement permitted by ACI 318 (ACI 318M) or PCI MNL 116 when tested according to ASTM C 1218/C 1218M.
- D. Normal-Weight Concrete Mixtures: Proportion full-depth mixture by either laboratory trial batch or field test data methods according to ACI 211.1, with materials to be used on Project, to provide normal-weight concrete with the following properties:
 - 1. Compressive Strength (28 Days): 5000 psi (34.5 MPa).
 - 2. Maximum Water-Cementitious Materials Ratio: 0.45.
- E. Water Absorption: 6 percent by weight or 14 percent by volume, tested according to PCI MNL 116.
- F. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content complying with PCI WINL 116.
- G. When included in design mixtures, add other admixtures to concrete mixtures according to manufacturer's instructions.
- H. Concrete Mix Adjustments: Concrete mix design adjustments may be proposed if characteristics of materials, Project conditions, weather, test results, or other circumstances warrant.

2.11 MOLD FABRICATION

- A. Molds: Accurately construct molds, mortar tight, of sufficient strength to withstand pressures due to concrete-placement operations and temperature changes and for prestressing and detensioning operations. Coat contact surfaces of molds with release agent before reinforcement is placed. Avoid contamination of reinforcement and prestressing tendons by release agent.
- B. Maintain molds to provide completed precast structural concrete units of shapes, lines, and dimensions indicated, within fabrication tolerances specified.
 - 1. Edge and Corner Treatment: Uniformly chamfered.

2.12 FABRICATION

- A. Cast-in Anchors, Inserts, Plates, Angles, and Other Anchorage Hardware: Fabricate anchorage hardware with sufficient anchorage and embedment to comply with design requirements. Accurately position for attachment of loose hardware, and secure in place during pre-casting operations. Locate anchorage hardware where it does not affect position of main reinforcement or concrete placement.
 - 1. Weld-headed studs and deformed bar anchors used for anchorage according to AWS D1.1/D1.1M and AWS C5.4, "Recommended Practices for Stud Welding. "

- B. Furnish loose hardware items including steel plates, clip angles, seat angles, anchors, dowels, cramps, hangers, and other hardware shapes for securing precast structural concrete units to supporting and adjacent construction.
- C. Cast-in reglets, slots, holes, and other accessories in precast structural concrete units as indicated on the Contract Drawings.
- D. Cast-in openings larger than 10 inches (250 mm) in any dimension. Do not drill or cut openings or prestressing strand without Architect's approval.
- E. Reinforcement: Comply with recommendations in PCI MNL 116 for fabricating, placing, and supporting reinforcement.
 - 1. Clean reinforcement of loose rust and mill scale, earth, and other materials that reduce or destroy the bond with concrete. When damage to epoxy-coated reinforcement exceeds limits specified, repair with patching material compatible with coating material and epoxy coat bar ends after cutting.
 - 2. Accurately position, support, and secure reinforcement against displacement during concrete-placement and consolidation operations. Completely conceal support devices to prevent exposure on finished surfaces.
 - 3. Place reinforcement to maintain at least 3/4-inch (19-mm) minimum coverage. Increase cover requirements according to ACI 318 (ACI 318M) when units are exposed to corrosive environment or severe exposure conditions. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position while placing concrete. Direct wire tie ends away from finished, exposed concrete surfaces.
 - 4. Place reinforcing steel and prestressing strand to maintain at least 3/4-inch (19-mm) minimum concrete cover. Increase cover requirements for reinforcing steel to 1-1/2 inches (38 mm) when units are exposed to corrosive environment or severe exposure conditions. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position while placing concrete. Direct wire tie ends away from finished, exposed concrete surfaces.
 - 5. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh spacing and wire tie laps, where required by design. Offset laps of adjoining widths to prevent continuous laps in either direction.
- F. Reinforce precast structural concrete units to resist handling, transportation, and erection stresses.
- G. Prestress tendons for precast structural concrete units by either pretensioning or post-tensioning methods. Comply with PCI/MNL 116.
 - 1. Delay detensioning or post-tensioning of precast, prestressed structural concrete units until concrete has reached its indicated minimum design release compressive strength as established by test cylinders cured under same conditions as concrete.
 - 2. Detension pretensioned tendons either by gradually releasing tensioning jacks or by heat cutting tendons, using a sequence and pattern to prevent shock or unbalanced loading.
 - 3. If concrete has been heat cured, detension while concrete is still warm and moist to avoid dimensional changes that may cause cracking or undesirable stresses.
 - 4. Protect strand ends and anchorages with bituminous, zinc-rich, or epoxy paint to avoid corrosion and possible rust spots.

5. Protect strand ends and anchorages with a minimum of 1-inch- (25-mm-) thick, nonmetallic, non-shrink, grout mortar and sack rub surface. Coat or spray the inside surfaces of pocket with bonding agent before installing grout.
- H. Comply with requirements in PCI MNL 116 and in this Section for measuring, mixing, transporting, and placing concrete. After concrete batching, no additional water may be added.
- I. 1. Place concrete in a continuous operation to prevent seams or planes of weakness from forming in precast concrete units.
- J. Thoroughly consolidate placed concrete by internal and external vibration without dislocating or damaging reinforcement and built-in items, and minimize pour lines, honeycombing, or entrapped air on surfaces. Use equipment and procedures complying with PCI MNL 116.
 1. Place self-consolidating concrete without vibration according to PCI TR-6, "Interim Guidelines for the Use of Self-Consolidating Concrete in Precast/Prestressed Concrete Institute Member Plants. "
- K. Comply with ACI 306.1 procedures for cold-weather concrete placement.
- L. Comply with PCI MNL 116 procedures for hot-weather concrete placement.
- M. Identify pickup points of precast structural concrete units and orientation in structure with permanent markings, complying with markings indicated on Shop Drawings. Imprint or permanently mark casting date on each precast structural concrete unit on a surface that will not show in finished structure.
- N. Cure concrete, according to requirements in PCI MNL 116, by moisture retention without heat or by accelerated heat curing using low-pressure live steam or radiant heat and moisture. Cure units until compressive strength is high enough to ensure that stripping does not have an effect on performance or appearance of final product.
- O. Discard and replace precast structural concrete units that do not comply with requirements, including structural, manufacturing tolerance, and appearance, unless repairs meet requirements in PCI MNL 116 and meet Architect's approval.

2.13 FABRICATION TOLERANCES

- A. Fabricate precast structural concrete units straight and true to size and shape with exposed edges and corners precise and true so each finished unit complies with PCI MNL 116 product dimension tolerances.

2.14 COMMERCIAL FINISHES

- A. Grade A Finish: Fill surface blemishes with the exception of air holes 1/16 inch (1.6 mm) in width or smaller, and form marks where the surface deviation is less than 1/16 inch (1.6 mm). Float apply a neat cement-paste coating to exposed surfaces. Rub dried paste coat with burlap to remove loose particles. Discoloration at form joints is permitted. Grind smooth all form joints.

- B. Smooth, steel trowel finish unformed surfaces. Consolidate concrete, bring to proper level with straightedge, float, and trowel to a smooth, uniform finish.

2.15 SOURCE QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to evaluate precast structural concrete fabricator's quality-control and testing methods.
 - 1. Allow testing agency access to material storage areas, concrete production equipment, concrete placement, and curing facilities. Cooperate with testing agency and provide samples of materials and concrete mixtures as may be requested for additional testing and evaluation.
- B. Testing: Test and inspect precast structural concrete according to PCI MNL 116 requirements.
 - 1. Test and inspect self-consolidating concrete according to PCI TR-6.
- C. Strength of precast structural concrete units will be considered deficient if units fail to comply with ACI 318 (ACI 318M) requirements for concrete strength.
- D. If there is evidence that strength of precast concrete units may be deficient or may not comply with ACI 318 (ACI 318M) requirements, employ a qualified testing agency to obtain, prepare, and test cores drilled from hardened concrete to determine compressive strength according to ASTM C 42/C 42M.
 - 1. A minimum of three representative cores will be taken from units of suspect strength, from locations directed by Architect.
 - 2. Cores will be tested in an air-dry condition or, if units will be wet under service conditions, test cores after immersion in water in a wet condition.
 - 3. Strength of concrete for each series of 3 cores will be considered satisfactory if average compressive strength is equal to at least 85 percent of 28-day design compressive _____ strength and no single core is less than 75 percent of 28-day design compressive strength.
 - 4. Test results will be made in writing on same day that tests are performed, with copies to Architect, Contractor, and precast concrete fabricator. Test reports will include the following:
 - a. Project identification name and number.
 - b. Date when tests were performed.
 - c. Name of precast concrete fabricator.
 - d. Name of concrete testing agency.
 - e. Identification letter, name, and type of precast concrete unit(s) represented by core tests; design compressive strength; type of break; compressive strength at breaks, corrected for length-diameter ratio; and direction of applied load to core in relation to horizontal plane of concrete as placed.
- E. Patching: If core test results are satisfactory and precast structural concrete units comply with requirements, clean and dampen core holes and solidly fill with same precast concrete mixture that has no coarse aggregate, and finish to match adjacent precast concrete surfaces.

- F. Defective Units: Discard and replace precast structural concrete units that do not comply with requirements, including strength, manufacturing tolerances, and color and texture range. Chipped, spalled, or cracked units may be repaired, subject to Architect's approval. Architect reserves the right to reject precast units that do not match approved samples, sample panels, and mockups.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine supporting structural frame or foundation and conditions for compliance with requirements for installation tolerances, true and level bearing surfaces, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. Do not install precast concrete units until supporting, cast-in-place, building structural framing has attained minimum allowable design compressive strength or until supporting steel or other structure is complete.

3.2 INSTALLATION

- A. Install clips, hangers, bearing pads, and other accessories required for connecting precast structural concrete units to supporting members and backup materials.
- B. Erect precast structural concrete level, plumb, and square within specified allowable tolerances. Provide temporary structural framing, supports, and bracing as required to maintain position, stability, and alignment of units until permanent connection.
 - 1. Install temporary steel or plastic spacing shims or bearing pads as precast structural concrete units are being erected. Tack weld steel shims to each other to prevent shims from separating.
 - 2. Maintain horizontal and vertical joint alignment and uniform joint width as erection progresses.
 - 3. Remove projecting lifting devices and grout fill voids within recessed lifting devices flush with surface of adjacent precast surfaces when recess is exposed.
 - 4. For hollow-core slab voids used as electrical raceways or mechanical ducts, align voids between units and tape butt joint at end of slabs.
- C. Connect precast structural concrete units in position by bolting, welding, grouting, or as otherwise indicated on Shop Drawings. Remove temporary shims, wedges, and spacers as soon as practical after connecting and grouting are completed.
 - 1. Do not permit connections to disrupt continuity of roof flashing.
- D. Field cutting of precast units is not permitted without approval of the Architect.
- E. Fasteners: Do not use drilled or powder-actuated fasteners for attaching accessory items to precast, prestressed concrete units.

- F. Welding: Comply with applicable AWS D1.1/D1.1M and AWS D1.4 for welding, welding electrodes, appearance, quality of welds, and methods used in correcting welding work.
 - 1. Protect precast structural concrete units and bearing pads from damage by field welding or cutting operations, and provide noncombustible shields as required.
 - 2. Clean weld-affected steel surfaces with chipping hammer followed by brushing, and apply a minimum 4.0-mil- (0.1 -mm-) thick coat of galvanized repair paint to galvanized surfaces according to ASTM A 780.
 - 3. Remove, reweld, or repair incomplete and defective welds.
- G. Grouting: Grout connections and joints and open spaces at keyways, connections, and joints where required or indicated on Shop Drawings. Retain grout in place until hard enough to support itself. Pack spaces with stiff grout material, tamping until voids are completely filled.
 - 1. Place grout to finish smooth, level, and plumb with adjacent concrete surfaces.
 - 2. Fill joints completely without seepage to other surfaces.
 - 3. Trowel top of grout joints on roofs smooth and uniform. Finish transitions between different surface levels not steeper than 1 to 12.
 - 4. Place grout end cap or dam in voids at ends of hollow-core slabs.
 - 5. Promptly remove grout material from exposed surfaces before it affects finishes or hardens.
 - 6. Keep grouted joints damp for not less than 24 hours after initial set.

3.3 ERECTION TOLERANCES

- A. Erect precast structural concrete units level, plumb, square, true, and in alignment without exceeding the noncumulative erection tolerances of PCI MNL 135.
- B. Minimize variations between adjacent slab members by jacking, loading, or other method recommended by fabricator and approved by Architect.

3.4 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:
 - 1. Erection of precast structural concrete members.
- B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- C. Field welds will be visually inspected and nondestructive tested according to ASTM E 165 or ASTM E 709. High-strength bolted connections will be subject to inspections.
- D. Testing agency will report test results promptly and in writing to Contractor and Architect.
- E. Repair or remove and replace work where tests and inspections indicate that it does not comply with specified requirements.
- F. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

- G. Prepare test and inspection reports.

3.5 REPAIRS

- A. Repair precast structural concrete units if permitted by Architect.
 - 1. 1. Repairs may be permitted if structural adequacy, serviceability, durability, and appearance of units has not been impaired.
- B. Mix patching materials and repair units so cured patches blend with color, texture, and uniformity of adjacent exposed surfaces and show no apparent line of demarcation between original and repaired work, when viewed in typical daylight illumination from a distance of 20 feet (6 m).
- C. Prepare and repair damaged galvanized coatings with galvanizing repair paint according to ASTM A 780.
- D. Remove and replace damaged precast structural concrete units that cannot be repaired or when repairs do not comply with requirements as determined by Architect.

3.6 CLEANING

- A. Clean mortar, plaster, fireproofing, weld slag, and other deleterious material from concrete surfaces and adjacent materials immediately.
- B. Clean exposed surfaces of precast concrete units after erection and completion of joint treatment to remove weld marks, other markings, dirt, and stains.
 - 1. Perform cleaning procedures, if necessary, according to precast concrete fabricator's written recommendations. Clean soiled precast concrete surfaces with detergent and water, using stiff fiber brushes and sponges, and rinse with clean water. Protect other work from staining or damage due to cleaning operations.
 - 2. Do not use cleaning materials or processes that could change the appearance of exposed concrete finishes or damage adjacent materials.

END OF SECTION

SECTION 03401

PRE-CAST CONCRETE EXTERIOR STRUCTURES

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. Work Includes
 - 1. Precast concrete structures.

1.3 REFERENCES

- A. American Concrete Institute
 - 1. ACI 301 - Structural Concrete for Buildings.
 - 2. ACI 318 - Building Code Requirements for Reinforced Concrete.
 - 3. ACI 350 R - Concrete Sanitary Engineering Structures.
- B. American Society for Testing Materials (ASTM International)
 - 1. ASTM A 153 - Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - 2. ASTM A307 - Specification for Low-Carbon Steel Externally and Internally Threaded Standard Fasteners.
 - 3. ASTM A325 - Specification for High Strength Bolts for Structural Steel Joints, Including Suitable Nuts and Plain Hardened Washers.
 - 4. ASTM A615 - Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
 - 5. ASTM C33 - Concrete Aggregates.
 - 6. ASTM C150 - Portland Cement.
 - 7. ASTM C260 - Air Entraining Admixtures for Concrete.
 - 8. ASTM C330 - Lightweight Aggregates for Structure Concrete.
 - 9. ASTM C494 - Chemical Admixtures for Concrete.
- C. Precast/Prestressed Concrete Institute
 - 1. PCI MNL-116 - Manual for Quality Control for Plants and Production of Precast and Prestressed Concrete Products.
 - 2. PCI MNL-120 - Design Handbook - Precast and Prestressed Concrete.
 - 3. PCI MNL-123 - Manual on Design of Connections for Precast Prestressed Concrete.
 - 4. PCI MNL-127 - Manual on Recommended Practice for Erection of Precast Concrete.
- D. Concrete Reinforcing Steel Institute, "Manual of Standard Practice. "

- E. The most stringent code shall govern.

1.4 QUALITY ASSURANCE

A. Testing:

1. Certification from independent testing agency supplied by the manufacturer.
2. Cost of Testing: Borne by Contractor.

B. Codes and Standards:

1. Except as modified by the requirements specified herein and/or the details shown on the Project Drawings, all work included in this section shall conform to the applicable provisions of the following codes and standards:
 - a. ACI 301
 - b. ACI 318
 - c. PCI MNL-116
 - d. PCI MNL-120
 - e. PCI MNL-123
 - f. Concrete Reinforcing Steel Institute, "Manual of Standard Practice"

1.5 STRUCTURAL DESIGN REQUIREMENTS

- A. Structural calculations are required for all precast concrete structures which address all anticipated loading conditions as indicated on the Drawings, as specified herein, and as required by local and state building codes. All load cases shall be considered, and the design shall be based on the governing case which produces the greatest stresses on the structure. Load cases to be addressed include: tanks empty with saturated soil outside, tanks full with saturated soil outside, tanks full with dry soils outside and tanks full with no soil pressure outside. .
- B. Maximum ground water elevation shall be assumed to be at finish grade level. Saturated soils shall be assumed to exert a minimum equivalent fluid pressure of 90 p.c.f. onto the structure.
- C. All structures shall be designed to resist buoyancy when empty and the ground saturated to the surface. The minimum safety factor against buoyancy shall be 1.25. Only the weight of the empty concrete structure and the weight of the soil directly above the anti-flotation collar shall be considered in calculating the forces to resist buoyancy. For buoyancy calculations, the density of the saturated soil shall be assumed at 37.6 lbs./cu.ft. The density of concrete shall be assumed to be 150 lbs./cu.ft.
- D. Effects on all vertical, horizontal and lifting loads anticipated on the finished structure shall be included in the analysis and design. Loading from piping and equipment, snow, and adjacent H-20 live load shall be included.
- E. Watertight pipe penetrations shall be provided for structures designed to retain liquids through the use of cast-in rubber or neoprene gaskets complying with ASTM C443 and C923 or wall pipes with intermediate wall collar.

- F. All structures designed to retain liquids shall be watertight and shall be tested for leaks before backfilling. Testing shall be performed for a minimum of 24 hours after presoaking. There shall be no visible leaks and loss of water shall be less than 0.1% of tank volume or less than h" drop whichever is more restrictive.
- G. Where conditions arise which are not specifically covered by these specifications, the current Standards of ACI 301, 304, 306, 311, 313, 315, 318, 350R, and ASTM C-94, C478, 090 and C913 shall govern.
- H. Design calculations for the above conditions shall be prepared, signed and sealed by a Professional Engineer, registered in the State of Connecticut, and submitted to the Engineer for review with detailed shop drawings of all structures.

1.6 SUBMITTALS

- A. Submit shop drawings under provisions of Section 01340.
- B. Submit design calculations and shop drawings indicating fabrication details, reinforcement, connection details, support items, member cross-sections and dimensions, gaskets, openings, manhole steps, size and type of reinforcement and lifting devices which shall be signed and sealed by a Professional Engineer licensed in the state where the Contract is performed.
- C. Indicate design loads, deflections, cambers, bearing requirements, and special conditions.
- D. Submit product data under provisions of Section 01340.
- E. Submit product data indicating standard component configurations, design loads, deflections, cambers, and bearing requirements.
- F. Submit data on proposed use of any admixture under provisions of Section 01340.
- G. Submit fabricator's installation instructions under provisions of Section 01340.
- H. Submit design data under provisions of Section 01340.
- I. Submit design data reports indicating calculations for loadings and stresses of fabricated, designed framing.

1.7 QUALIFICATIONS

- A. Fabricator: Company specializing in manufacturing the work of this Section with minimum three years documented experience.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site at such times to assure continuity of installation.
- B. Handle precast members in position consistent with their shape and design. Lift and support only from support points.

- C. Lifting or Handling Devices: Capable of supporting member in positions anticipated during manufacture, storage transportation, erection.
- D. Store and protect members to prevent staining, cracking, chipping, spalling, or other physical damage of concrete.
- E. Mark each member with date of production and final position in structure.

PART 2 - PRODUCTS

2.1 CONCRETE MATERIALS

- A. Water: Clean and free of organic materials, strong acids or alkalis, oils and salt. Potable.
- B. Portland Cement ASTM-C150, Type I or Type III American manufacture. One (1) brand used throughout project.
- C. Sand: (Fine aggregate) shall be clean, sharp, coarse, (minimum fines) hard, natural sand free from salt, loam, clay and other deleterious materials and shall conform to ASTM Specification C33 or C330.
- D. Coarse Aggregate: Shall be well graded, washed gravel or crushed stone and shall conform to ASTM Specification C33 for normal weight aggregate.
- E. Admixtures: Determined by precast fabricator as appropriate to design requirements and conforming to ASTM Specification C494.

2.2 REINFORCEMENT

- A. Reinforcing Steel: Reinforcing bars shall be deformed high strength bars conforming to ASTM M15, Grade 40 or 60.
- B. Welded Wire Fabric: Fabric shall conform to ASTM A1 85.

2.3 FORMWORK

- A. Forms: Wood, metal, plastic, or other acceptable material that will produce required finish surfaces and is non-reactive with concrete.
- B. Maintain formwork to provide completed precast concrete units of shapes, lines, and dimensions indicated, within fabrication tolerances specified in PCI MNL-116.
- C. Metal tie rods used to attach forms to concrete must be snapped off to 1-1/2 inch from the face of the concrete and patched with non-shrink grout.

2.4 ACCESSORIES

- A. Grout: Non-shrink, non-metallic, pre-mixed, non-corrosive, non-staining product containing selected silica sands, portland cement, shrinkage compensating agents, plasticizing and water reducing agents. Minimum yield strength of 10,000 psi at 28 days.
- B. High Strength Threaded Fasteners: Heavy hexagon structural bolts, heavy bolts, and hardened washers complying with ASTM A325. Exposed units galvanized per ASTM A153; others painted with rust-inhibitive primer.
- C. Anchor Bolts, Nuts and Washers: Low-carbon steel bolts, regular hexagon nuts and carbon steel washers conforming to ASTM A307. Exposed units galvanized per ASTM A153; others painted with rust-inhibitive primer.
- D. Supports for Reinforcement: Provide bolsters, chairs, spacers, and other devices for spacing, supporting and fastening reinforcing in accordance with CRSI and ACI recommendations.
- E. Gaskets: Pipe penetrations in precast structures shall be constructed with integrally cast rubber or neoprene gaskets unless otherwise indicated. Integrally cast gaskets shall be Dura Seal III, A-lok, Dual Seal or equal.
- F. Wall sleeves: Where indicated on the Drawings, precast structures shall have integrally cast mechanical joint wall sleeves. Integrally cast wall sleeves shall be cast iron Clow F-1429, Omni-Sleeve, or equal.
- G. Plastic coated steel steps equal to: manhole steps made by M.A. Industries, Inc. Peachtree City, GA.
- H. All steps shall be capable of resisting the following loads without loosening or damage.
 - 1. Minimum horizontal pull out load 400 lb.
 - 2. Minimum vertical load 800 lb.
- I. Joint Sealant: Watertight sealant shall be installed between all precast sections on both the interior and exterior edges of the joint. Ramsneck mastic tape or equal.

2.5 FABRICATION

- A. Fabrication procedure to conform to PCI MNL-116.
- B. Maintain plant records and quality control program during production of precast members. Make records available upon request.
- C. Reinforcing steel surface shall be free of rust, mill scale and any coating including ice that could destroy or reduce bond.
- D. Ensure reinforcing steel, anchors, inserts, plates, angles, and other cast-in items are embedded and located as indicated on shop drawings. Locate anchors where they do not affect position of main reinforcement or placing of concrete.
- E. Tension reinforcement tendons as required to achieve design load criteria.

- F. Cast-in required openings with a dimension larger than 6 inches or where indicated on Drawings.
- G. Concrete Strength: Minimum ultimate compressive strength of the concrete at age 28 days shall be 5000 psi. Slump shall not exceed 4 inches.

2.6 FINISHING

- A. Ensure exposed-to-view finish surfaces of precast concrete members are uniform in color and appearance.
- B. Cure members under identical conditions to develop required concrete quality, and minimize appearance blemishes such as non-uniformity, staining, or surface cracking.
- C. Interior and exterior above grade surfaces - Exposed-to-View Finish: Normal plant finish with fins and protrusions removed, ground edges and ends, and flat face surfaces.
- D. Exterior below grade surfaces - Normal plant finish; normal form joint marks, small surface holes caused by air bubbles, minor chips, and spalling at edges or ends, without major discoloration will be tolerated, but no major or unsightly imperfections, honeycomb or structural defects will be permitted.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that site conditions are ready to receive work and field measurements are as on Drawings.
- B. Ensure excavation is free of water and precast units will not be placed on frozen or soft ground.
- C. Beginning of installation means installer accepts existing conditions.

3.2 PREPARATION

- A. A. Prepare support equipment for the erection procedure, temporary shoring and bracing, and induced loads during erection.

3.3 INSTALLATION

- A. Install precast units according to manufacturer's recommendations and the Drawings without damage to structural capacity, shape, or finish. Replace or repair damaged members.
- B. Align and maintain uniform horizontal and vertical joints, as erection progresses.
- C. Maintain temporary bracing in place until final support is provided. Protect members from staining.

- D. Grout open spaces at connections and joints. Provide forms or other acceptable method to retain grout in place until sufficiently hard to support itself. Pack spaces with stiff grout material, tamping until voids are completely filled. Place grout to finish smooth, plumb and level with adjacent concrete surfaces. Keep grouted joints damp for not less than 24 hours after initial set. Promptly remove grout material from exposed surfaces before it hardens.
- E. Do not use power-actuated fasteners for surface attachment of accessory items in precast, prestressed unit unless otherwise accepted by precast manufacturer.

3.4 ERECTION TOLERANCES

- A. Erect members level and plumb.
- B. Conform to PCI MNL-127.

END OF SECTION

SECTION 03500

LEAKAGE TESTS FOR CONCRETE STRUCTURES

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. SCOPE OF WORK

1. All fluid retaining concrete structures are required to be watertight and shall be tested by the Contractor and witnessed by the Engineer. Structures shall be tested with water as specified.
2. All tests shall be conducted in a manner to minimize as much as possible any interference with the Contractor's work or progress.
3. The Contractor shall notify the Engineer when the work is ready for testing, and tests shall be made as soon thereafter as possible. Personnel for reading meters, gauges, or other measuring devices and all other labor, equipment, air, water, and materials, including meters, gauges, fuel, bulkheads, and accessory equipment, shall be furnished by the Contractor.

1.3 REFERENCES

- A. AWWA Journal "A Summary Report on Concrete Water-Holding Structures," AWWA Committee on Concrete Holding Structures
- B. ACI Manual of "Environmental Engineering Practice Concrete Structures," ACI Committee 350 R-89, Part 4, Detroit, MI

1.4 QUALITY ASSURANCE

- A. Leakage tests of chambers and tanks shall be made before backfilling by filling the structure with water to the operating level, and then allowing a 24 hour presoak period, refilling if necessary to the operating level, and then observing the water surface level for the following 24 hours. Inspection for leakage will be made of the exterior surface of the structure, especially in the area around construction joints.
- B. Each section of water-holding structure which can be isolated in actual operation shall be isolated and tested for leakage.

1.5 ALLOWABLE LIMITS

- A. Leakage within the allowable limits will be accepted for structures from which there are no visible leaks and loss of water is less than 0.1 % of the tank volume or the water surface water drops no more than 1/2 inch during the 24 hour test whichever is the most restrictive measurement method.
- B. If leakage exceeds the allowable limits, the structure shall be repaired by locating, removing and replacing the leaking portions of the structure, in accordance with the requirements of Section 03732 or by other means approved by the Engineer. Each structure shall be retested until leakage is within the specified limits.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 WATER

- A. Water for filling of the structures will be supplied by the Contractor. The Contractor shall supply all hoses, pumps, labor, and other material to fill the structures. Water for subsequent fillings, if required, shall be at the expense of the Contractor.

3.2 TEST RESULTS

- A. The test results shall be reported in writing to the Engineer on the same day that the tests are made.

3.3 ADDITIONAL TESTS

- A. Contractor shall perform additional tests, at no additional cost to the owner, as may be required to demonstrate concrete repairs are adequate and conform to the leakage criteria established herein.

END OF SECTION

SECTION 03732
CONCRETE REPAIR

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. SECTION INCLUDES

- 1. Preparation of concrete and application of repair materials.
- 2. Rehabilitation of concrete surfaces.

1.3 REFERENCES

- A. ANSI/ASTM C404 - Aggregates for Masonry Grouts.
- B. ANSI/ASTM C882 - Bond Strength of Epoxy-Resin Systems Used with Concrete.
- C. ASTM C33 - Concrete Aggregates.
- D. ASTM C150 - Portland Cement.

1.4 SUBMITTALS

- A. Submit narrative on repair methods and product data under provisions of Section 01300.
- B. Submit product data indicating product standards, physical and chemical characteristics, technical specifications, limitations, maintenance instructions, and general recommendations regarding each material.
- C. Submit manufacturer's installation instructions under provisions of Section 01300.
- D. Accurately record actual locations of structural reinforcement repairs and type of repair. Submit information under section 01700.

1.5 QUALITY ASSURANCE

- A. Materials Manufacturer: Company specializing in manufacturing the products specified in this Section with minimum three years documented experience.

- B. Applicator: Company specializing in concrete repair approved by materials manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Section 01600.
- B. Store and protect products under provisions of Section 01600.
- C. Comply with instructions for storage, shelf life limitations, and handling.

PART 2 - PRODUCTS

2.1 PATCHING MATERIALS

- A. Epoxy adhesive: Two-part epoxy adhesive meeting the following minimum characteristics:

<u>Characteristic</u>	<u>Test Method</u>	<u>Results*</u>
Bond Strength	ANSI/ASTM C882	1,900 psi
Tensile Strength	ASTM D638	4,800 psi
Flexural Strength	ASTM D790	7,400 psi
Compressive Strength	ASTM D695	9,500 psi

* 14 day Test Results

Epoxy adhesive shall be Sikadur 32, Hi-Mod, as manufactured by Sika Corporation or approved equal.

- B. Repair Mortar: A one component, ready to use with water, high strength polymer modified cementitious patching mortar for horizontal, vertical and overhead repair of concrete. The repair mortar shall be Octocrete as manufactured by IPA Systems, Inc. or approved equal.
- C. Bonding Agent: Acrylic Bonding Agent shall be Octoblen, as manufactured by IPA Systems, Inc. or approved equal.
- D. Portland Cement: ASTM C150, Type 1; gray.
- E. Sand: ASTM C33; uniformly graded, clean.
- F. Water: Clean and potable.

- G. Cleaning Agent: Commercial muriatic acid of 10 percent strength.

2.2 MIXING EPOXY ADHESIVE

- A. Mix in accordance with manufacturer's instructions for purpose intended.
- B. Mix components in clean equipment or containers. Conform to pot life and workability limits.

2.3 MIXING CEMENTITIOUS REPAIR MORTAR

- A. Mix mortar in accordance with manufacturer's instructions for purpose intended.
- B. Include bonding agent as additive to mix as recommended by manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that surfaces are ready to receive work.
- B. Beginning of installation means installer accepts existing surfaces.

3.2 PREPARATION

- A. Clean concrete surfaces of dirt, laitance, corrosion, or other contamination by water blasting, sand blasting, acid washing as required by the manufacturers instructions. Rinse surface and allow to dry.
- B. Flush out cracks and voids with water to remove laitance and dirt.
- C. Provide temporary entry ports spaced to accomplish movement of fluids between ports, no deeper than the depth of the crack to be filled. Limit port size diameter to be no greater than the thickness of the crack. Provide temporary seal at concrete surface to prevent leakage of adhesive.
- D. For areas to be patched, remove broken and soft concrete 1/4 inch deep. Remove corrosion from steel. Clean surfaces mechanically; wash with acid and rinse with water.

3.3 REPAIR WORK

- A. Repair exposed structural, shrinkage, and settlement cracks of concrete by the epoxy injection method.
- B. Repair holes and cavities with Repair Mortar.

3.4 INJECTION - EPOXY RESIN ADHESIVE

- A. Inject adhesive into prepared ports under pressure using equipment appropriate for particular application.
- B. Begin injection at lower entry port and continue until adhesive appears in adjacent entry port. Continue from port to port until entire crack is filled.
- C. Remove temporary seal and excessive adhesive.
- D. Clean surfaces adjacent to repair and blend finish.

3.5 APPLICATION - REPAIR MORTAR

- A. Trowel apply mortar mix as recommended by the manufacturer. Tamp into place filling voids at spalled areas.
- B. For patching honeycomb, trowel mortar onto surface, working into honeycomb to bring surface flush with surrounding area. Finish trowel surface to match surrounding area.
- C. Cover exposed steel reinforcement with epoxy mortar; feather edges to flush surface.

END OF SECTION

DIVISION 4
MASONRY

SECTION 04816

CONCRETE UNIT MASONRY ASSEMBLIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Concrete masonry units.
2. Decorative concrete masonry units.
3. Mortar and grout.
4. Steel reinforcing bars.
5. Masonry joint reinforcement.
6. Ties and anchors.
7. Embedded flashing.
8. Miscellaneous masonry accessories.
9. Masonry-cell insulation.

B. Related Sections:

1. Section 033000 "Cast-in-Place Concrete" for dovetail slots for masonry anchors.
2. Section 071900 "Water Repellents" for water repellents applied to concrete unit masonry.
3. Section 076200 "Sheet Metal Flashing and Trim" for sheet metal flashing and for furnishing manufactured reglets installed in masonry joints.

1.3 DEFINITIONS

- A. CMU(s): Concrete masonry unit(s).

- B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.4 PERFORMANCE REQUIREMENTS

- A. Provide structural unit masonry that develops a net-area compressive strength of 2,000 psi at 28 days.
 1. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.

1.5 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Owner will engage a qualified independent testing agency to perform preconstruction testing indicated below. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.
 - 1. Concrete Masonry Unit Test: For each type of unit required, according to ASTM C 140 for compressive strength.

1.6 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For the following:
 - 1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
 - 2. Reinforcing Steel: Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement." Show elevations of reinforced walls.
 - 3. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.
- C. Samples for Initial Selection:
 - 1. Decorative CMUs, in the form of small-scale units.
 - 2. Colored mortar.
 - 3. Weep holes/vents.
- D. Samples for Verification: For each type and color of the following:
 - 1. Exposed Decorative CMUs.
 - 2. Colored-aggregate mortar. Make Samples using same sand and mortar ingredients to be used on Project.
 - 3. Accessories embedded in masonry.

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Material Certificates: For each type and size of the following:
 - 1. Masonry units.
 - a. Include data on material properties material test reports substantiating compliance with requirements.
 - b. For masonry units used in structural masonry, include data and calculations establishing average net-area compressive strength of units.
 - 2. Cementitious materials. Include brand, type, and name of manufacturer.
 - 3. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
 - 4. Grout mixes. Include description of type and proportions of ingredients.

5. Reinforcing bars.
 6. Joint reinforcement.
 7. Anchors, ties, and metal accessories.
- C. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91 for air content.
 2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.
- D. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.
- E. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.8 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM C 1093 for testing indicated.
- B. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.
- C. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.
- D. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.
- E. Sample Panels: Build sample panels to verify selections made under sample submittals and to demonstrate aesthetic effects. Comply with requirements in Section 014000 "Quality Requirements" for mockups.
1. 1. Build sample panels for each type of exposed unit masonry construction in sizes approximately 48 inches (1200 mm) long by 48 inches (1200 mm) high by full thickness.
 2. Where masonry is to match existing, erect panels adjacent and parallel to existing surface.
 3. Protect approved sample panels from the elements with weather-resistant membrane.
 4. Approval of sample panels is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; aesthetic qualities of workmanship; and other material and construction qualities specifically approved by Architect in writing.

- a. Approval of sample panels does not constitute approval of deviations from the Contract Documents contained in sample panels unless such deviations are specifically approved by Architect in writing.

- F. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination. "

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
- B. Deliver preblended, dry mortar mix in moisture-resistant containers designed for use with dispensing silos. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in covered weatherproof dispensing silos.
- C. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.10 PROJECT CONDITIONS

- A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
 - 1. Extend cover a minimum of 24 inches (600 mm) down both sides of walls and hold cover securely in place.
- B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.
- C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
 - 1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
 - 2. Protect sills, ledges, and projections from mortar droppings.
 - 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
 - 4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.
- D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530. I/ASCE 6/TMS 602.

1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F (4 deg C) and higher and will remain so until masonry has dried, but not less than 7 days after completing cleaning.
- E. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.1 MASONRY UNITS, GENERAL

- A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects will be exposed in the completed Work.
- B. Fire-Resistance Ratings: Where indicated, provide units that comply with requirements for fire-resistance ratings indicated as determined by testing according to ASTM E 119, by equivalent masonry thickness, or by other means, as acceptable to authorities having jurisdiction.

2.2 CONCRETE MASONRY UNITS

- A. Regional Materials: CMUs shall be manufactured within 500 miles (800 km) of Project site from aggregates and cement that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles (800 km) of Project site.
- B. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.
 1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
 2. Provide square-edged units for outside corners unless otherwise indicated.
- C. Integral Water Repellent: Provide units made with integral water repellent for exposed units and where indicated.
 1. Integral Water Repellent: Liquid polymeric, integral water-repellent admixture that does not reduce flexural bond strength. Units made with integral water repellent, when tested according to ASTM E 514 as a wall assembly made with mortar containing integral water-repellent manufacturer's mortar additive, with test period extended to 24 hours, shall show no visible water or leaks on the back of test specimen.
 - a. Products: Subject to compliance with requirements.
- D. CMUs: ASTM C 90.
 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2800 psi (19.3 MPa).
 2. Density Classification: Normal weight unless otherwise indicated.
 3. Size (Width): Manufactured to dimensions 3/8 inch less than nominal dimensions.

4. Exposed Faces: Provide color and texture matching the range represented by Architect's sample.
- E. Decorative CMUs: ASTM C 90.
1. Density Classification: Normal weight.
 2. Size (Width): Manufactured to dimensions specified in "CMUs" Paragraph.
 3. Pattern and Texture:
 - a. Standard pattern, split-face finish
 4. Colors: As selected by Architect from manufacturer's full range.
 5. Special Aggregate: Provide units made with aggregate matching aggregate in Architect's sample.

2.3 MORTAR AND GROUT MATERIALS

- A. Regional Materials: Aggregate for mortar and grout, cement, and lime shall be extracted, harvested, or recovered, as well as manufactured, within 500 miles (800 km) of Project site.
- B. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
- C. Hydrated Lime: ASTM C 207, Type S.
- D. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.
- E. Aggregate for Mortar: ASTM C 144.
1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
 2. For joints less than 1/4 inch (6 mm) thick, use aggregate graded with 100 percent passing the No. 16 (1.18-mm) sieve.
 3. White-Mortar Aggregates: Natural white sand or crushed white stone.
 4. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.
- F. Aggregate for Grout: ASTM C 404.
- G. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.
1. Products: Subject to compliance with requirements.
- H. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with CMUs, containing integral water repellent by same manufacturer.
1. Products: Subject to compliance with requirements.

- I. Water: Potable.

2.4 REINFORCEMENT

- A. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60 (Grade 420).
- B. Masonry Joint Reinforcement, General: ASTM A 951/A 951M.
 - 1. Interior Walls: Hot-dip galvanized, carbon steel.
 - 2. Exterior Walls: Hot-dip galvanized, carbon steel.
 - 3. Wire Size for Side Rods: 0.148-inch (3.77-mm) diameter.
 - 4. Wire Size for Cross Rods: 0.148-inch (3.77-mm) diameter.
 - 5. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches (407 mm) o.c.
 - 6. Provide in lengths of not less than 10 feet (3 m), with prefabricated corner and tee units.
- C. Masonry Joint Reinforcement for Single-Wythe Masonry: Either ladder or truss type with single pair of side rods.

2.5 TIES AND ANCHORS

- A. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated.
 - 1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82/A 82M; with ASTM A 153/A 153M, Class B-2 coating.
 - 2. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, with ASTM A 153/A 153M, Class B coating.
 - 3. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Adjustable Anchors for Connecting to Concrete: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
 - 1. Connector Section: Dovetail tabs for inserting into dovetail slots in concrete and attached to tie section; formed from 0.060-inch- (1.52-mm-) thick, steel sheet, galvanized after fabrication.
 - 2. Tie Section: Triangular-shaped wire tie, sized to extend within 1 inch (25 mm) of masonry face, made from 0.187-inch- (4.76-mm-) diameter, hot-dip galvanized steel wire
- C. Partition Top anchors: 0.105-inch- (2.66-mm-) thick metal plate with 3/8-inch- (9.5-mm-) diameter metal rod 6 inches (152 mm) long welded to plate and with closed-end plastic tube fitted over rod that allows rod to move in and out of tube. Fabricate from steel, hot-dip galvanized after fabrication.
- D. Rigid Anchors: Fabricate from steel bars 1-1/2 inches (38 mm) wide by 1/4 inch (6.35 mm) thick by 24 inches (610 mm) long, with ends turned up 2 inches (51 mm) or with cross pins unless otherwise indicated.
 - 1. Corrosion Protection: Hot-dip galvanized to comply with ASTM A 153/A 153M.

2.6 MISCELLANEOUS ANCHORS

- A. Anchor Bolts: Headed steel bolts complying with ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A 153/A 153M, Class C; of dimensions indicated.

2.7 EMBEDDED FLASHING MATERIALS

- A. Metal Flashing: Provide metal flashing complying with SMACNA's "Architectural Sheet Metal Manual" and as follows:

1. Stainless steel: ASTM A 240/A 240M, Type 304, 0.016 inch thick.
2. Fabricate continuous flashings in sections 96 inches long minimum, but not exceeding 12 feet (3.7 m). Provide splice plates at joints of formed, smooth metal flashing.
3. Fabricate through-wall metal flashing embedded in masonry from stainless steel, with ribs at 3-inch intervals along length of flashing to provide an integral mortar bond.
 - a. Products: Subject to compliance with requirements., available products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) Cheney Flashing Company; Cheney Flashing (Dovetail) or Cheney 3-Way Flashing (Sawtooth).
 - 2) Keystone Flashing Company, Inc.; Keystone 3-Way Interlocking Thruwall Flashing.
 - 3) Sandell Manufacturing Co., Inc.; Mechanically Keyed Flashing.
4. Fabricate through-wall flashing with snaplock receiver on exterior face where indicated to receive counterflashing.
5. Fabricate through-wall flashing with drip edge where indicated. Fabricate by extending flashing 1/2 inch out from wall, with outer edge bent down 30 degrees and hemmed.
6. Fabricate through-wall flashing with sealant stop unless otherwise indicated. Fabricate by bending metal back on itself 3/4 inch at exterior face of wall and down into joint 1/4 inch to form a stop for retaining sealant backer rod.
7. Metal Drip Edge: Fabricate from stainless steel. Extend at least 3 inches into wall and 1/2 inch out from wall, with outer edge bent down 30 degrees and hemmed.
8. Metal Sealant Stop: Fabricate from stainless steel. Extend at least 3 inches into wall and out to exterior face of wall. At exterior face of wall, bend metal back on itself for 3/4 inch and down into joint 1/4 inch to form a stop for retaining sealant backer rod.
9. Metal Expansion-Joint Strips: Fabricate from stainless steel to shapes indicated.

- B. Flexible Flashing: Use the following unless otherwise indicated:

1. Rubberized-Asphalt Flashing: Composite flashing product consisting of a pliable, adhesive rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than 0.030 inch.
 - a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

- 1) Advanced Building Products Inc.; Peel-N-Seal.
 - 2) Carlisle Coatings & Waterproofing; CCW-705-TWF Thru-Wall Flashing.
 - 3) Dayton Superior Corporation, Dur-O-Wal Division; Dur-O-Barrier ThruWall Flashing.
 - 4) Fiberweb, Clark Hammerbeam Corp.; Aquaflash 500.
 - 5) Grace Construction Products, W. R. Grace & Co. - Conn.; Perm-A-Barrier Wall Flashing.
 - 6) Heckmann Building Products Inc.; No. 82 Rubberized-Asphalt Thru-Wall Flashing.
 - 7) Hohmann & Barnard, Inc.; Textroflash.
 - 8) W. R. Meadows, Inc.; Air-Shield Thru-Wall Flashing.
 - 9) Sandell Manufacturing Co., Inc.; Sando-Seal. 10) Williams Products, Inc.; Everlastic MF-40.
- b. Accessories: Provide preformed corners, end dams, other special shapes, and seaming materials produced by flashing manufacturer.
2. Elastomeric Thermoplastic Flashing: Composite flashing product consisting of a polyester-reinforced ethylene interpolymer alloy.
- a. a. Products: Subject to compliance with requirements, [available products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) DuPont; Thru-Wall Flashing.
 - 2) Hohmann & Barnard, Inc.; Flex-Flash.
 - 3) Hyload, Inc.; Hyload Cloaked Flashing System. 4) Net USA, Ltd.; Total Flash.
 - b. Monolithic Sheet: Elastomeric thermoplastic flashing, 0.040 inch thick.
 - c. Self-Adhesive Sheet: Elastomeric thermoplastic flashing, 0.025 inch thick, with a 0.015-inch- thick coating of adhesive.
 - d. Self-Adhesive Sheet with Drip Edge: Elastomeric thermoplastic flashing, 0.025 inch thick, with a 0.015-inch- thick coating of rubberized-asphalt adhesive. Where flashing extends to face of masonry, rubberized-asphalt coating is held back approximately 1-1/2 inches from edge.
 - 1) Color: Gray.
 - e. Accessories: Provide preformed corners, end dams, other special shapes, and seaming materials produced by flashing manufacturer.
- C. Application: Unless otherwise indicated, use the following:
1. Where flashing is indicated to receive counterflashing, use metal flashing.
 2. Where flashing is indicated to be turned down at or beyond the wall face, use metal flashing.
 3. Where flashing is partly exposed and is indicated to terminate at the wall face, use metal flashing with a drip edge.
 4. Where flashing is fully concealed, use flexible flashing.

- D. Single-Wythe CMU Flashing System: System of CMU cell flashing pans and interlocking CMU web covers made from high-density polyethylene incorporating chemical stabilizers that prevent UV degradation. Cell flashing pans have integral weep spouts that are designed to be built into mortar bed joints and weep collected moisture to the exterior of CMU walls and that extend into the cell to prevent clogging with mortar.
1. Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Mortar Net USA, Ltd.; Blok-Flash.
- E. Solder and Sealants for Sheet Metal Flashings: As specified in Section 07620 "Sheet Metal Flashing and Trim. "
1. Solder for Stainless Steel: ASTM B 32, Grade Sn60, with acid flux of type recommended by stainless-steel sheet manufacturer.
 2. Elastomeric Sealant: ASTM C 920, chemically curing silicone sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- F. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

2.8 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Pre-molded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene.
- B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-8050rPVC, complying with ASTM D 2287, Type PVC-65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.
- C. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).
- D. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and hold reinforcing bars in center of cells. Units are formed from 0.148-inch (3.77mm) steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.
1. Products: Subject to compliance with requirements.

2.9 MASONRY-CELL INSULATION

- A. Loose-Granular Fill Insulation: Perlite complying with ASTM C 549, Type II (surface treated for water repellency and limited moisture absorption) or Type IV (surface treated for water repellency and to limit dust generation).

- B. Molded-Polystyrene Insulation Units: Rigid, cellular thermal insulation formed by the expansion of polystyrene-resin beads or granules in a closed mold to comply with ASTM C 578, Type I. Provide specially shaped units designed for installing in cores of masonry units.

2.10 MORTAR AND GROUT MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.
 - 1. Do not use calcium chloride in mortar or grout.
 - 2. Use portland cement-lime mortar unless otherwise indicated.
 - 3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.
- B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
- C. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification. Provide the following types of mortar for applications stated unless another type is indicated.
 - 1. For reinforced masonry, use Type S.
- D. Colored-Aggregate Mortar: Produce required mortar color by using colored aggregates and natural color or white cement as necessary to produce required mortar color.
 - 1. Mix to match Architect's sample.
 - 2. Application: Use colored aggregate mortar for exposed mortar joints with the following units:
 - a. Decorative CMUs.
- E. Grout for Unit Masonry: Comply with ASTM C 476.
 - 1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 1.15.1 in ACI 530. I/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.
 - 2. Proportion grout in accordance with ASTM C 476, Table 1.
 - 3. Provide grout with a slump of 8 to 11 inches (203 to 279 mm) as measured according to ASTM C 143/C 143M.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 - 1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.
 - 2. Verify that foundations are within tolerances specified.
 - 3. Verify that reinforcing dowels are properly placed.
- B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Build chases and recesses to accommodate items specified in this and other Sections.
- B. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.
- C. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

3.3 TOLERANCES

- A. Dimensions and Locations of Elements:
 - 1. For dimensions in cross section or elevation do not vary by more than plus 1/2 inch (12 mm) or minus 1/4 inch (6 mm).
 - 2. For location of elements in plan do not vary from that indicated by more than plus or minus 1/2 inch (12 mm).
 - 3. For location of elements in elevation do not vary from that indicated by more than plus or minus 1/4 inch (6 mm) in a story height or 1/2 inch (12 mm) total.
- B. Lines and Levels:
 - 1. For bed joints and top surfaces of bearing walls do not vary from level by more than 1/4 inch in 10 feet (6 mm in 3 m), or 1/2 inch (12 mm) maximum.
 - 2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2 inch (12 mm) maximum.
 - 3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2 inch (12 mm) maximum.
 - 4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2 inch (12 mm) maximum.

5. For lines and surfaces do not vary from straight by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2 inch (12 mm) maximum.
6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), or 1/2 inch (12 mm) maximum.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm), with a maximum thickness limited to 1/2 inch (12 mm).
2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch (3 mm).
3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch (9 mm) or minus 1/4 inch (6 mm).
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm).

3.4 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less than nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.
- C. Lay concealed masonry with all units in a Wythe in running bond or bonded by lapping not less than 4-inches (100-mm). Bond and interlock each course of each Wythe at corners. Do not use units with less than nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.
- D. Stopping and Resuming Work: Stop work by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar before laying fresh masonry.
- E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- F. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.
- G. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below and rod mortar or grout into core.
- H. Fill cores in hollow CMUs with grout 24 inches (600 mm) under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.
- I. Build non-load-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.

1. Fasten partition top anchors to structure above and build into top of partition. Grout cells of CMUs solidly around plastic tubes of anchors and push tubes down into grout to provide 1/2-inch (13-mm) clearance between end of anchor rod and end of tube. Space anchors 48 inches (1200 mm) o.c. unless otherwise indicated.
2. Wedge non-load-bearing partitions against structure above with small pieces of tile, slate, or metal. Fill joint with mortar after dead-load deflection of structure above approaches final position.
3. At fire-rated partitions, treat joint between top of partition and underside of structure.

3.5 MORTAR BEDDING AND JOINTING

A. Lay hollow CMUs as follows:

1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
2. With webs fully bedded in mortar in all courses of piers, columns, and pilasters.
3. With webs fully bedded in mortar in grouted masonry, including starting course on footings.
4. With entire units, including areas under cells, fully bedded in mortar at starting course on footings where cells are not grouted.

B. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

D. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

3.6 MASONRY-CELL INSULATION

A. Pour granular insulation into cavities to fill void spaces. Maintain inspection ports to show presence of insulation at extremities of each pour area. Close the ports after filling has been confirmed. Limit the fall of insulation to one story high, but not more than 20 feet (6 m).

B. Install molded-polystyrene insulation units into masonry unit cells before laying units.

3.7 MASONRY JOINT REINFORCEMENT

A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch (16 mm) on exterior side of walls, 1/2 inch (13 mm) elsewhere. Lap reinforcement a minimum of 6 inches (150 mm).

B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.

C. Provide continuity at wall intersections by using prefabricated T-shaped units.

D. Provide continuity at corners by using prefabricated L-shaped units.

- E. Cut and bend reinforcing units as directed by manufacturer for continuity at corners, returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.8 ANCHORING MASONRY TO CONCRETE

- A. Anchor masonry to structural steel and concrete where masonry abuts or faces structural steel or concrete to comply with the following:
 - 1. Provide an open space not less than 1/2 inch (13 mm) wide between masonry and concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
 - 2. Anchor masonry with anchors embedded in masonry joints and attached to structure.
 - 3. Space anchors as indicated, but not more than 24 inches (610 mm) o.c.. vertically and 36 inches (915 mm) o.c. horizontally.

3.9 CONTROL AND EXPANSION JOINTS

- A. General: Install control and expansion joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in plane wall or partition movement.
- B. Form control joints in concrete masonry as follows:
 - 1. Fit bond-breaker strips into hollow contour in ends of CMUs on one side of control joint. Fill resultant core with grout and rake out joints in exposed faces for application of sealant.
 - 2. Install preformed control-joint gaskets designed to fit standard sash block.
 - 3. Install interlocking units designed for control joints. Install bond-breaker strips at joint. Keep head joints free and clear of mortar or rake out joint for application of sealant.
 - 4. Install temporary foam-plastic filler in head joints and remove filler when unit masonry is complete for application of sealant.

3.10 LINTELS

- A. Provide steel lintels at all wall openings.
- B. Provide minimum bearing of 8 inches (200 mm) at each jamb unless otherwise indicated.

3.11 FLASHING

- A. General: Install embedded flashing in masonry at lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.
- B. Install flashing as follows unless otherwise indicated:
 - 1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.

2. At lintels, extend flashing a minimum of 6 inches into masonry at each end. At heads and sills, extend flashing 6 inches at ends and turn up not less than 2 inches to form end dams.
 3. Interlock end joints of ribbed sheet metal flashing by overlapping ribs not less than 1-1/2 inches or as recommended by flashing manufacturer, and seal lap with elastomeric sealant complying with requirements in Section 079200 "Joint Sealants" for application indicated.
 4. Install metal drip edges and seal stops with ribbed sheet metal flashing by interlocking hemmed edges to form hooked seam. Seal seam with elastomeric sealant complying with requirements in Section 079200 "Joint Sealants" for application indicated.
 5. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall and adhere flexible flashing to top of metal drip edge.
 6. Install metal flashing termination beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall and adhere flexible flashing to top of metal flashing termination.
 7. Cut flexible flashing off flush with face of wall after masonry wall construction is completed.
- C. Install single-wythe CMU flashing system in bed joints of CMU walls where indicated to comply with manufacturer's written instructions. Install CMU cell pans with upturned edges located below face shells and webs of CMUs above and with weep spouts aligned with face of wall. Install CMU web covers so that they cover upturned edges of CMU cell pans at CMU webs and extend from face shell to face shell.
- D. Install reglets and nailers for flashing and other related construction where they are shown to be built into masonry.

3.12 REINFORCED UNIT MASONRY INSTALLATION

- A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
 2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other loads that may be placed on them during construction.
- B. Placing Reinforcement: Comply with requirements in ACI 530. I/ASCE 6/TMS 602.
- C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.
1. Comply with requirements in ACI 530. I/ASCE 6/TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
 2. Limit height of vertical grout pours to not more than 60 inches (1520 mm).

3.13 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas, as needed to perform tests and inspections. Retesting of materials that fail to meet specified requirements shall be done at Contractor's expense.
- B. Inspections: Level 2 special inspections according to the "International Building Code."
 - 1. Begin masonry construction only after inspectors have verified proportions of site prepared mortar.
 - 2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
 - 3. Place grout only after inspectors have verified proportions of site-prepared grout.
- C. Testing Prior to Construction: One set of tests.
- D. Testing Frequency: One set of tests for each 5000 sq. ft. (464 sq. m) of wall area or portion thereof.
- E. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C 140 for compressive strength.
- F. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.

3.14 REPAIRING, POINTING, AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.
- B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.
- C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
 - 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
 - 2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
 - 3. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.

3.15 MASONRY WASTE DISPOSAL

- A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

- B. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.
1. Crush masonry waste to less than 4 inches (100 mm) in each dimension.
 2. Mix masonry waste with at least two parts of specified fill material for each part of masonry waste. Fill material is specified in Section 02220 "Excavation, Backfilling and Compaction".
 3. Do not dispose of masonry waste as fill within 18 inches (450 mm) of finished grade.
- C. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION

DIVISION 5
STEEL

SECTION 05100
STRUCTURAL STEEL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Structural steel.
2. Grout.

B. Related Sections:

1. Division 01 Section "Quality Requirements" for independent testing agency procedures and administrative requirements.
2. Division 05 Section "Metal Fabrications" for steel lintels and shelf angles not attached to structural-steel frame, miscellaneous steel fabrications and other metal items not defined as structural steel.
3. Division 05 Section "Metal Stairs."
4. Division 09 painting Sections for surface-preparation and priming requirements.

1.3 DEFINITIONS

- A. Structural Steel: Elements of structural-steel frame, as classified by AISC 303, "Code of Standard Practice for Steel Buildings and Bridges. "
- B. Seismic-Load-Resisting System: Elements of structural-steel frame designated as "SLRS" or along grid lines designated as "SLRS" on Drawings, including columns, beams, and braces and their connections.
- C. Heavy Sections: Rolled and built-up sections as follows:
1. Shapes included in ASTM A 6/A 6M with flanges thicker than 1-1/2 inches.
 2. Welded built-up members with plates thicker than 2 inches.
 3. Column base plates thicker than 2 inches.
- D. Protected Zone: Structural members or portions of structural members indicated as "Protected Zone" on Drawings. Connections of structural and nonstructural elements to protected zones are limited.

- E. Demand Critical Welds: Those welds, the failure of which would result in significant degradation of the strength and stiffness of the Seismic-Load-Resisting System and which are indicated as "Demand Critical" or "Seismic Critical" on Drawings.

1.4 PERFORMANCE REQUIREMENTS

- A. Connections: Provide details of simple shear connections required by the Contract Documents to be selected or completed by structural-steel fabricator, including comprehensive engineering design by a qualified professional engineer, to withstand loads indicated and comply with other information and restrictions indicated.

1. Select and complete connections using schematic details indicated and AISC 360.
2. Use LRFD; data are given at factored-load level.

- B. Moment Connections: Type FR, fully restrained.

1.5 SUBMITTALS

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

- B. Shop Drawings: Show fabrication of structural-steel components.

1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
2. Include embedment drawings.
3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pre-tensioned and slip-critical high-strength bolted connections.
5. Identify members and connections of the seismic-load-resisting system.
6. Indicate locations and dimensions of protected zones.
7. Identify demand critical welds.
8. For structural-steel connections indicated to comply with design loads, include structural design data.

- C. Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQRs): Provide according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," for each welded joint whether prequalified or qualified by testing, including the following:

1. Power source (constant current or constant voltage).
2. Electrode manufacturer and trade name, for demand critical welds.

- D. Qualification Data: For qualified Installer, fabricator, testing agency.

- E. Welding certificates.

- F. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

- G. Mill test reports for structural steel, including chemical and physical properties.
- H. Product Test Reports: For the following:
 - 1. Bolts, nuts, and washers including mechanical properties and chemical analysis.
 - 2. Direct-tension indicators.
 - 3. Tension-control, high-strength bolt-nut-washer assemblies.
 - 4. Shop primers.
 - 5. Nonshrink grout.
- I. Source quality-control reports.

1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD.
- B. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category ACSE.
- C. Shop-Painting Applicators: Qualified according to AISC's Sophisticated Paint Endorsement PI or SSPC-QP 3, "Standard Procedure for Evaluating Qualifications of Shop Painting Applicators. "
- D. Welding Qualifications: Qualify procedures and personnel according to
- E. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - 1. Welders and welding operators performing work on bottom-flange, demand critical welds shall pass the supplemental welder qualification testing, as required by AWS D1.8. FCAW-S and FCAW-G shall be considered separate processes for welding personnel qualification.
- F. Comply with applicable provisions of the following specifications and documents:
 - 1. AISC 303.
 - 2. AISC 341 and AISC 341s1.
 - 3. AISC 360.
 - 4. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts. "
- G. Pre-installation Conference: Conduct conference at Project site.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.
 - 1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

- B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.
 - 1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
 - 2. Clean and re-lubricate bolts and nuts that become dry or rusty before use.
 - 3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F 1852 fasteners and for retesting fasteners after lubrication.

1.8 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL MATERIALS

- A. W-Shapes: ASTM A 572/A 572M, Grade 50.
- B. Channels, Angles, S-Shapes: ASTM A 36/A 36M.
- C. Plate and Bar: ASTM A 36/A 36M.
- D. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B, structural tubing.
- E. Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade B.
 - 1. Weight Class: Standard.
 - 2. Finish: Black except where indicated to be galvanized.
- F. Welding Electrodes: Comply with AWS requirements.

2.2 BOLTS, CONNECTORS, AND ANCHORS

- A. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers; all with plain finish.
 - 1. Direct-Tension Indicators: ASTM F 959, Type 325, compressible-washer type with plain finish.

- B. High-Strength Bolts, Nuts, and Washers: ASTM A 490, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers with plain finish.
 - 1. Direct-Tension Indicators: ASTM F 959, Type 490, compressible-washer type with plain finish.
- C. Zinc-Coated High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade DH heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers.
 - 1. Finish: Hot-dip zinc coating.
 - 2. Direct-Tension Indicators: ASTM F 959, Type 325, compressible-washer type with mechanically deposited zinc coating finish.
- D. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, heavy-hex head assemblies consisting of steel structural bolts with splined ends, heavyhex carbon-steel nuts, and hardened carbon-steel washers.
 - 1. Finish: Plain.
- E. Shear Connectors: ASTM A 108, Grades 1015 through 1020, headed-stud type, coldfinished carbon steel; AWS DI. 1/1)1.1M, Type B.
- F. Unheaded Anchor Rods: ASTM A 36/A 36M.
 - 1. Configuration: Straight.
 - 2. Nuts: ASTM A 563 hex carbon steel.
 - 3. Plate Washers: ASTM A 36/A 36M carbon steel.
 - 4. Washers: ASTM F 436, Type 1, hardened carbon steel.
 - 5. Finish: Plain.
- G. Headed Anchor Rods: ASTM F 1554, Grade 36, straight.
 - 1. Nuts: ASTM A 563 hex carbon steel.
 - 2. Plate Washers: ASTM A 36/A 36M carbon steel.
 - 3. Washers: ASTM F 436, Type 1, hardened carbon steel.
 - 4. Finish: Plain.
- H. Threaded Rods: ASTM A 36/A 36M.
 - 1. Nuts: ASTM A 563 hex carbon steel.
 - 2. Washers: ASTM A 36/A 36M carbon steel.
 - 3. Finish: Plain.
- I. Eye Bolts and Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1030.
- J. Sleeve Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1018.

2.3 PRIMER

- A. Primer: Comply with Division 09 painting Sections.
- B. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.
- C. Galvanizing Repair Paint: ASTM A 780.

2.4 GROUT

- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.5 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC 360.
 - 1. Camber structural-steel members where indicated.
 - 2. Fabricate beams with rolling camber up.
 - 3. Identify high-strength structural steel according to ASTM A 6/A 6M and maintain markings until structural steel has been erected.
 - 4. Mark and match-mark materials for field assembly.
 - 5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.
- B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
 - 1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.
- C. Bolt Holes: Cut, drill, mechanically thermal cut, or punch standard bolt holes perpendicular to metal surfaces.
- D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.
- E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 3, "Power Tool Cleaning."
- F. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.
- G. Steel Wall-Opening Framing: Select true and straight members for fabricating steel wall opening framing to be attached to structural steel. Straighten as required to provide uniform, square, and true members in completed wall framing.
- H. Welded Door Frames: Build up welded door frames attached to structural steel. Weld exposed joints continuously and grind smooth. Plug-weld fixed steel bar stops to frames. Secure removable

stops to frames with countersunk machine screws, uniformly spaced not more than 10 inches o.c. unless otherwise indicated.

- I. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel framing members.
 1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
 2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
 3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.6 SHOP CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
 1. Joint Type: Snug tightened.
- B. Weld Connections: Comply with AWS DI.1/D1.1M and AWS DI.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
 1. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material.

2.7 SHOP PRIMING

- A. Shop prime steel surfaces except the following:
 1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
 2. Surfaces to be field welded.
 3. Surfaces to be high-strength bolted with slip-critical connections.
 4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
 5. Galvanized surfaces.
- B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
 1. SSPC-SP 2, "Hand Tool Cleaning. "
 2. SSPC-SP 3, "Power Tool Cleaning."
 3. SSPC-SP 7/NACE No. 4, "Brush-Off Blast Cleaning. "
 4. SSPC-SP 11, "Power Tool Cleaning to Bare Metal."
 5. SSPC-SP 14/NACE No. 8, "Industrial Blast Cleaning. "
 6. SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning. "
 7. SSPC-SP IONACE No. 2, "Near-White Blast Cleaning. "
 8. SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning."
 9. SSPC-SP 8, "Pickling."

- C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
 - 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
 - 2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.
- D. Painting: Prepare steel and apply a one-coat, nonasphaltic primer complying with SSPCPS Guide 7.00, "Painting System Guide 7.00: Guide for Selecting One-Coat Shop Painting Systems," to provide a dry film thickness of not less than 1.5 mils.

2.8 GALVANIZING

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123/A 123M.
 - 1. Fill vent and drain holes that will be exposed in the finished Work unless they will function as weep holes, by plugging with zinc solder and filing off smooth.
 - 2. Galvanize lintels, shelf angles and welded door frames attached to structural-steel frame and located in exterior walls.

2.9 SOURCE QUALITY CONTROL

- A. Testing Agency: Owner will engage an independent testing and inspecting agency to perform shop tests and inspections and prepare test reports.
 - 1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
- B. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.
- C. Bolted Connections: Shop-bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts. "
- D. Welded Connections: In addition to visual inspection, shop-welded connections will be tested and inspected according to AWS DI. I/DI.IM and the following inspection procedures, at testing agency's option:
 - 1. Liquid Penetrant Inspection: ASTM E 165.
 - 2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
 - 3. Ultrasonic Inspection: ASTM E 164.
 - 4. Radiographic Inspection: ASTM E 94.
- E. In addition to visual inspection, shop-welded shear connectors will be tested and inspected according to requirements in AWS DI.I/DI.IM for stud welding and as follows:

1. Bend tests will be performed if visual inspections reveal either a less-than continuous 360-degree flash or welding repairs to any shear connector.
2. Tests will be conducted on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D 1. I/DI. 1M.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify, with steel Erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
 1. Prepare a certified survey of bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.
 1. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.

3.3 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
- B. Base Bearing and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
 1. Set plates for structural members on wedges, shims, or setting nuts as required.
 2. Weld plate washers to top of baseplate.
 3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
 4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's installation instructions for shrinkage-resistant grouts.
- C. c. Maintain erection tolerances of structural steel within AISCs "Code of Standard Practice for Steel Buildings and Bridges. "

- D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
 - 1. Level and plumb individual members of structure.
 - 2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.
- E. Splice members only where indicated.
- F. Do not use thermal cutting during erection unless approved by Architect. Finish thermally cut sections within smoothness limits in AWS DI. I/DI. 1M.
- G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.
- H. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS DI. I/DI. 1M and manufacturer's written instructions.

3.4 FIELD CONNECTIONS

- A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
 - 1. Joint Type: Snug tightened.
- B. Weld Connections: Comply with AWS DI.1/D1.1M and AWS DI.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
 - 1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
 - 2. Remove backing bars or runoff tabs, back gouge, and grind steel smooth.
 - 3. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.

3.5 PREFABRICATED BUILDING COLUMNS

- A. Install prefabricated building columns to comply with AISC 360, manufacturer's written recommendations, and requirements of testing and inspecting agency that apply to the fire-resistance rating indicated.

3.6 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections.
- B. Bolted Connections: Bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts. "
- C. Welded Connections: Field welds will be visually inspected according to AWS DI.I/DI.IM.
 - 1. In addition to visual inspection, field welds will be tested and inspected according to AWS DI.I/DI.IM and the following inspection procedures, at testing agency's option:
 - a. Liquid Penetrant Inspection: ASTM E 165.
 - b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
 - c. Ultrasonic Inspection: ASTM E 164.
 - d. Radiographic Inspection: ASTM E 94.
- D. In addition to visual inspection, test and inspect field-welded shear connectors according to requirements in AWS DI. I/DI. 1M for stud welding and as follows:
 - 1. Perform bend tests if visual inspections reveal either a less-than-continuous 360degree flash or welding repairs to any shear connector.
 - 2. Conduct tests on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D I. I/DI. 1M.
- E. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

3.7 REPAIRS AND PROTECTION

- A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A 780.
- B. Touchup Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - 1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.
- C. Touchup Painting: Cleaning and touchup painting are specified in Division 09 painting Sections.

END OF SECTION

SECTION 05510

MISCELLANEOUS ALUMINUM FABRICATION

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. WORK INCLUDED

- 1. Custom fabricated aluminum items.

1.3 REFERENCE STANDARDS

- A. AA DAF-45 - Designation System for Aluminum Finishes
- B. AA SAA-46 - Standards for Anodized Architectural Aluminum
- C. ASTM B211- Aluminum-Alloy Bars, Rods, Wire.
- D. ASTM B221 - Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubing.
- E. ASTM B241 - Aluminum-Alloy Seamless Pipe and Seamless Extruded Tubes.
- F. ASTM B429 - Aluminum-Alloy Extruded Structural Pipe and Tube.
- G. AWS D1.1 - Structural Welding Code, and the Aluminum Association Standards; latest addition.
- H. ASTM B209 - Aluminum and Aluminum Alloy Sheet and Plate.
- I. ASTM B210 - Aluminum and Aluminum Alloy Drawn Seamless Tubes.

1.4 SUBMITTALS

- A. Submit shop drawings of metal fabrications and product data on manufactured items in accordance with Section 01300.
- B. Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners and accessories.
- C. Include erection drawings, elevations and details where applicable.

- D. Indicate welded connections using standard AWS welding symbols. Indicate net weld lengths.

1.5 QUALITY ASSURANCE

- A. Qualification of Installer: Use adequate numbers of skilled workman who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and methods needed for proper performance of the work of this section.
- B. Qualification of Manufacture: Products used in the work of this section shall be produced by manufacturers regularly engaged in the manufacture of similar items and with a history of successful production of these items.
- C. Requirements of Regulatory Agencies: All installations shall be in compliance with BOCA, Basic Building Code and Local Ordinances, and with the U.S. Department of Labor, Occupational Safety and Health Administration (OSHA) Standards.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Provide and install items as indicated on the Drawings, complete in respect to function as intended.

2.2 MATERIALS

- A. Aluminum: Aluminum work shall be fabricated of plates and rolled or extruded shapes. All aluminum shall conform to the appropriate current ASTM Specifications and alloy listed in the following table:

<u>Application</u>	<u>Designator</u>	<u>ASTM</u> Alloy
Plate	B209	6061-T6
Bolts, Screws	B211	6061-T6
Nuts, 1/4" Tap and Under	B211	2024-T4
Nuts, 5/16" Tap and Over	B211	6061-T6
Rolled or Extruded Shapes	B308	6061-T6
Extruded Bar	B211	6061-T6
Drawn Tube	B210	6061-T6
Extruded Tube	B221	6061-T6
Pipe	B241	6061-T6
Shims	B209	1100-0

- B. Stainless Steel: Stainless steel work shall be fabricated of plates and rolled or cold drawn shapes. All stainless steel shall conform to the appropriate current ASTM Specifications and shall be Type 304L (extra low carbon).

2.3 FASTENERS & ANCHORAGE

- A. Anchorage shall be provided where necessary for fastening miscellaneous metal items securely in place. Anchorage not otherwise specified or indicated shall include slotted inserts made to engage with the anchors, expansion shields, and power-driven fasteners when approved for concrete; toggle bolts for masonry; machine and carriage bolts for aluminum.
- B. ASTM A193 GRB8 stainless steel bolts with (2) stainless steel plate washers and ASTM A194 GRF8 nuts.

2.4 FABRICATION

- A. Verify dimensions on-site prior to shop fabrication.
- B. Fabricate items with joints neatly fitted and properly secured.
- C. Fit and shop assemble in largest particle sections for delivery to site.
- D. Grind exposed welds smooth and flush with adjacent finished surfaces.
- E. Exposed Mechanical Fastenings: Flush countersunk screws or bolts unobtrusively located consistent with design or structure, except where specifically noted otherwise.
- F. Make exposed joints flush butt type hair line joints where mechanically fastened.
- G. Supply components required for proper anchorage of metal fabrications. Fabricate anchorage and related components of same material and finish as metal fabrication, unless otherwise specified in schedule herein.

2.5 DISSIMILAR MATERIALS

- A. Where dissimilar metals are in contact, or where aluminum is in contact with concrete, mortar, masonry, wet or pressure-treated wood, or absorptive materials subject to wetting, the surfaces shall be protected with a coat of bituminous paint.

2.6 STAIRS

- A. All interior and exterior stairs shall be Aluminum per Section 2.2 Materials.
- B. Provide stair layout in accordance with the Drawings.
- C. Provide detailed shop drawings for the design and layout of all connections and individual members.

2.7 STOP GATES

- A. Stop gates shall be 114" thick 6061-T6 aluminum plate, reinforced as required to deflect no more than 1/30th of the span. Bottom edge shall be beveled for positive seating. Stop gate shall have 112" Ø bar handle.
- B. Stop gate frame shall be one piece 6061-T6 extruded aluminum frame mitered and welded continuously with one piece polymer guide. Frame shall be supplied with mounting flange to mount inside concrete channel.
- C. Stop gate and frame shall be Model 203 by Halliday Products, equal product by Washington Aluminum Company or approved equal.

PART 3 - EXECUTION

3.1 ERECTION

- A. Obtain Engineer's review prior to site cutting or making adjustments which are not part of scheduled work.
- B. Install items square and level, accurately fitted and free from distortion or defects.
- C. Make provision for erection stresses by temporary bracing. Keep work in alignment.
- D. Replace items damaged in course of installation.
- E. Perform field welding in accordance with AWS D1.1.
- F. After installation, touch-up field welds and scratched and damaged surfaces.
- G. Supply to appropriate sections, items requiring to be cast into concrete or embedded in masonry, complete with necessary setting templates.

END OF SECTION

SECTION 05511

METAL STAIRS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Industrial-type stairs with steel grating treads.

B. Related Sections:

- 1. Division 03 Section "Cast-in-Place Concrete" for concrete fill for stair treads and platforms.
- 2. Division 05 Section "Pipe and Tube Railings" for pipe and tube railings.

1.3 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design metal stairs, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

- B. Structural Performance of Stairs: Metal stairs shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated.

- 1. Uniform Load: 100 lbf/sq. ft.
- 2. Concentrated Load: 300 lbf applied on an area of 4 sq. in..
- 3. Uniform and concentrated loads need not be assumed to act concurrently.
- 4. Stair Framing: Capable of withstanding stresses resulting from railing loads in addition to loads specified above.
- 5. Limit deflection of treads, platforms, and framing members to L/360.

- C. Structural Performance of Railings: Railings 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.

- 2. Infill of Guards:

- a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft..
 - b. Infill load and other loads need not be assumed to act concurrently.
- D. Seismic Performance: Metal stairs shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
1. Component Importance Factor is 1.5.

1.4 SUBMITTALS

- A. Product Data: For metal stairs and the following:
1. Prefilled metal-pan stair treads.
 2. Paint products.
 3. Grout.
- B. LEED Submittals:
1. Product Data for Credit MR 4.1: Indicating percentages by weight of postconsumer and preconsumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
- C. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
- D. Samples for Initial Selection: For products involving selection of color, texture, or design.
- E. Samples for Verification: For the following products, in manufacturer's standard sizes:
1. Precast concrete treads.
- F. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- G. Qualification Data: For qualified professional engineer.
- H. Welding certificates.
- I. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.
- J. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for stairs and railings.
1. Test railings according ASTM E 894 and ASTM E 935.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Fabricator of products.

- B. NAAMM Stair Standard: Comply with "Recommended Voluntary Minimum Standards for Fixed Metal Stairs" in NAAMM AMP 510, "Metal Stairs Manual," for class of stair designated, unless more stringent requirements are indicated.
 - 1. Preassembled Stairs: Commercial Service class.
- C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- D. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - 2. AWS D1.3, "Structural Welding Code - Sheet Steel. "

1.6 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 anchorages for metal stairs. 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.
- C. Coordinate locations of hanger rods and struts with other work so that they will not encroach on required stair width and will be within the fire-resistance-rated stair enclosure.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For components exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

2.2 FERROUS METALS

- A. Recycled Content of Steel Products: Provide products with average recycled content of steel products so postconsumer recycled content plus one-half of pre-consumer recycled content is not less than 25 percent.
- B. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- C. Steel Tubing: ASTM A 500 (cold formed) or ASTM A 513.
- D. 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.

- E. Steel Bars for Grating Treads: ASTM A 36/A 36M or steel strip, ASTM A 1011/A 1011M or ASTM A 1018/A 1018M.
- F. Wire Rod for Grating Crossbars: ASTM A 510.
- G. Uncoated, Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, either commercial steel, Type B, or structural steel, Grade 25, unless another grade is required by design loads; exposed.
- H. Uncoated, Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, either commercial steel, Type B, or structural steel, Grade 30, unless another grade is required by design loads.
- I. Galvanized-Steel Sheet: ASTM A 653/A 653M, G90 coating, either commercial steel, Type B, or structural steel, Grade 33, unless another grade is required by design loads.
- J. Woven-Wire Mesh: Intermediate-crimp, square pattern, 2-inch woven-wire mesh, made from 0.135-inch nominal diameter wire complying with ASTM A 510.
- K. Provide anchors for embedding units in concrete, either integral or applied to units, as standard with manufacturer.

2.3 NONFERROUS METALS

- A. Aluminum Extrusions: ASTM B 221 , Alloy 6063-T6.
- B. Aluminum Castings: ASTM B 26/B 26M, Alloy 443.0-F.
- C. Bronze Extrusions: ASTM B 455, Alloy UNS No. C38500 (extruded architectural bronze).
- D. Bronze Castings: ASTM B 584, Alloy UNS No. C83600 (leaded red brass) or No. 04400 (leaded semi-red brass).
- E. Nickel Silver Castings: ASTM B 584, Alloy UNS No. C97600 (20 percent leaded nickel bronze).

2.4 FASTENERS

- A. General: Provide zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 12 for exterior use, and Class Fe/Zn5 where built into exterior walls. Select fasteners for type, grade, and class required.
- B. Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.
- C. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563; and, where indicated, flat washers.
 - 1. Provide mechanically deposited or hot-dip, zinc-coated anchor bolts for stairs indicated to be galvanized.
- D. Machine Screws: ASME B18.6.3.

- E. Lag Screws: ASME B18.2.1.
- F. Plain Washers: Round, ASME B18.22.1.
- G. Lock Washers: Helical, spring type, ASME B1 8.21.1.
- H. Post-Installed Anchors: Torque-controlled expansion anchors or chemical 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, conducted by a qualified independent testing agency.
 - 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.

2.5 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. Shop Primers: Provide primers that comply with Division 09 painting Sections.
- C. 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.
- 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.
- F. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- G. Concrete Materials and Properties: Comply with requirements in Division 03 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3000 psi unless otherwise indicated.
- H. Welded Wire Fabric: ASTM A 185/A 185M, 6 by 6 inches, W1.4 by W1.4, unless otherwise indicated.

2.6 FABRICATION, GENERAL

- A. Provide complete stair assemblies, including metal framing, hangers, struts, railings, clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure.
 - 1. Join components by welding unless otherwise indicated.

2. Use connections that maintain structural value of joined pieces.
- B. Preassembled Stairs: Assemble stairs in shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- 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 bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- E. Form exposed work with accurate angles and surfaces and straight edges.
- F. Weld connections 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.
 2. Remove welding flux immediately.
 3. Weld exposed corners and seams continuously unless otherwise indicated.
 4. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 2 welds: completely sanded joint, some undercutting and pinholes okay.
- G. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts unless otherwise indicated. Locate joints where least conspicuous.

2.7 STEEL-FRAMED STAIRS

- A. Stair Framing:
 1. Fabricate stringers of steel channels.
 - a. Provide closures for exposed ends of channel stringers.
 2. Construct platforms of steel channel headers and miscellaneous framing members as needed to comply with performance requirements.
 3. Weld or bolt stringers to headers; weld or bolt framing members to stringers and headers. If using bolts, fabricate and join so bolts are not exposed on finished surfaces.
 4. Where stairs are enclosed by gypsum board assemblies, provide hanger rods or struts to support landings from floor construction above or below. Locate hanger rods and struts where they will not encroach on required stair width and will be within the fire resistance-rated stair enclosure.
 5. Where masonry walls support metal stairs, provide temporary supporting struts designed for erecting steel stair components before installing masonry.
- B. Metal Bar-Grating Stairs: Form treads and platforms to configurations shown from metal bar grating; fabricate to comply with NAAMM MBG 531, "Metal Bar Grating Manual. "

1. Fabricate treads and platforms from welded steel grating with 1-1/4-by-3/16-inch bearing bars at 15/16 inch (24 mm) o.c. and crossbars at 4 inches (100 mm) o.c.
2. Fabricate treads and platforms from welded or pressure-locked steel grating with openings in gratings no more than 5/16 inch (8 mm) in least dimension.
3. Surface: Serrated.
4. Finish: Galvanized.
5. Fabricate grating treads with rolled-steel floor plate or cast abrasive nosing and with steel angle or steel plate carrier at each end for stringer connections. Secure treads to stringers with bolts.
6. Fabricate grating platforms with nosing matching that on grating treads. Provide toe plates at open-sided edges of grating platforms. Weld grating to platform framing.

2.8 STAIR RAILINGS

- A. Comply with applicable requirements in Division 05 Section "Pipe and Tube Railings." Delete or revise any of three subparagraphs below to suit type of railing required. Coordinate with Section that specifies railings.

2.9 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish metal stairs after assembly.
- C. 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.
 2. Fill vent and drain holes that will be exposed in finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.
- D. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 1. Interior Stairs: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
- E. Apply shop primer to uncoated surfaces of metal stair components, except those with galvanized finishes and those to be embedded in concrete or masonry unless otherwise indicated. 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

3.1 INSTALLATION, GENERAL

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal stairs to in-place construction. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.
- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free of rack.
- C. Install metal stairs by welding stair framing to steel structure or to weld plates cast into concrete unless otherwise indicated.
- D. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- E. 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.
- F. Field Welding: Comply with requirements for welding in "Fabrication, General" Article.
- G. Place and finish concrete fill for treads and platforms to comply with Division 03 Section "Cast-in-Place Concrete."
 - 1. 1. Install abrasive nosings with anchors fully embedded in concrete. Center nosings on tread width.
- H. Install precast concrete treads with adhesive supplied by manufacturer.

3.2 INSTALLING METAL STAIRS WITH GROUTED BASEPLATES

- A. Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen to improve bond to surfaces. Clean bottom surface of baseplates.
- B. Set steel stair baseplates on wedges, shims, or leveling nuts. After stairs have been positioned and aligned, tighten anchor bolts. Do not remove wedges or shims but, If protruding, cut off flush with edge of bearing plate before packing with grout.
 - 1. Use nonmetallic, nonshrink grout unless otherwise indicated.
 - 2. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.3 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with 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 Division 09 painting Sections.
- C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION

SECTION 05521
PIPE TUBE AND RAILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Aluminum pipe and tube railings

B. Related Sections:

- 1. Division 05 Section "Metal Stairs" for steel tube railings associated with metal stairs.
- 2. Division 06 Section "Rough Carpentry" for wood blocking for anchoring railings.
- 3. Division 09 Section "Non-Structural Metal Framing" for metal backing for anchoring railings.
- 4. Division 03 Section "Cast-in-Place Concrete" for hot dipped galvanized handrails and guard rails.

1.3 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design railings, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

- B. General: In engineering railings to withstand structural loads indicated, determine allowable design working stresses of railing materials based on the following:

- 1. Steel: 72 percent of minimum yield strength.

- C. Structural Performance: Railings 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 lb/ 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.

- 2. Infill of Guards:

- a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft.

- b. Infill load and other loads need not be assumed to act concurrently.
- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
- E. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1.4 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 Initial Selection: For products involving selection of color, texture, or design.
- D. Samples for Verification: 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 finishing and connecting members at intersections.
- E. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- F. Qualification Data: For qualified professional engineer.
- G. Welding certificates.
- H. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.
- I. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, according to ASTM E 894 and ASTM E 935.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of railing from single source from single manufacturer.

- B. Welding Qualifications: Qualify procedures and personnel according to AWS DI. 101.1M, "Structural Welding Code - Steel. "
- C. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS DI. I/D1.1M, "Structural Welding Code - Steel."
 - 2. AWS DI.2/D1.2M, "Structural Welding Code - Aluminum. "

1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

1.7 COORDINATION AND SCHEDULING

- 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 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.
- C. 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.

PART 2 - PRODUCTS

2.1 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.

2.2 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, Alloy 6063-T6
- C. Extruded Structural Round Tubing: ASTM B 4291B 429M, Alloy 6063-T6.

- D. Drawn Seamless Tubing: ASTM B 210, Alloy 6063-T6.
- E. Plate and Sheet: ASTM B 209, Alloy 6061-T6.
- F. Die and Hand Forgings: ASTM B 247, Alloy 6061-T6.
- G. Castings: ASTM B 261B 26M, Alloy A356.O-T6.

2.3 STAINLESS STEEL CHAIN

- A. 1/4" Stainless steel straight link chain with stainless steel safety snap hook and 1/4" stainless steel eye bolts.

2.4 FASTENERS

- A. General: Provide the following:
 - 1. Aluminum Railings: Type 304 stainless-steel fasteners.
- 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 Fasteners for Interconnecting Railing Components:
 - 1. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless otherwise indicated.
 - 2. 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.
 - 3. Provide tamper-resistant machine screws for exposed fasteners unless otherwise indicated.
- C. Post-Installed Anchors: Torque-controlled expansion anchors or chemical 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, conducted by a qualified independent testing agency.

2.5 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. Etching Cleaner for Galvanized Metal: Complying with MPI#25.
- C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- D. Shop Primers: Provide primers that comply with Division 09 painting Sections.
- E. 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.
- F. Shop Primer for Galvanized Steel: Cementitious galvanized metal primer complying with MP1#26
- G. Intermediate Coats and Topcoats: Provide products that comply with Division 09 painting Sections.
- H. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.
- I. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- J. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.
 1. Water-Resistant Product: At exterior locations provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

2.6 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. Assemble railings in the shop 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 will be exposed to weather in a manner to exclude 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 connections unless otherwise indicated.
- H. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
 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 flux immediately.
 4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.
- I. Non-welded Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
1. 1. Fabricate splice joints for field connection using an epoxy structural adhesive if this is manufacturer's standard splicing method.
- J. Form changes in direction as follows:
1. As detailed.
- K. Bend members in jigs to produce uniform curvature for each 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. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch or less.
- N. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.
1. At brackets and fittings fastened to plaster or gypsum board partitions, provide crush-resistant fillers, or other means to transfer loads through wall finishes to structural supports and prevent bracket or fitting rotation and crushing of substrate.
- O. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.
- P. Perforated Steel Infill Panels: Fabricate infill panels from perforated plate panels Attached to stainless steel channel frames to existing stair stringers and upper handrail support with a minimum of exposed fasteners. Fabricate panel to fully integrate with existing stairway guard rails as indicated on drawings.
1. Perforated Panel: 16 gauge steel perforated panel with 63% open area airflow.
 2. Finish: Black polyester powder paint finish
- Q. Woven-Wire Mesh Infill Panels: Fabricate infill panels from woven-wire mesh crimped into I-by-1/2-by-1/8-inch metal channel frames. Make wire mesh and frames from same metal as railings in which they are installed.
1. Orient wire mesh with wires horizontal and vertical.
 2. Finish: Black polyester powder painted finish

- R. Toe Boards: Where indicated, provide toe boards at railings around openings and at edge of open-sided floors and platforms. Fabricate to dimensions and details indicated.

2.7 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- D. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.

2.8 ALUMINUM FINISHES

- A. Mechanical Finish: AA-MI 2 (Mechanical Finish: non-specular as fabricated).

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine plaster and gypsum board assemblies, where reinforced to receive anchors, to verify that locations of concealed reinforcements have been clearly marked for Installer. Locate reinforcements and mark locations if not already done.

3.2 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 have been 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. Corrosion Protection: Coat concealed surfaces of aluminum that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
- 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.

3.3 RAILING CONNECTIONS

- A. Non-welded Connections: Use mechanical or adhesive joints for permanently connecting railing components. Seal recessed holes of exposed locking screws using plastic cement filler colored to match finish of railings.
- B. 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.
- C. 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.

3.4 ANCHORING POSTS

- A. Anchor posts to metal surfaces with oval flanges, angle type, or floor type as required by conditions, connected to posts and to metal supporting members as follows:
 - 1. For steel pipe railings, weld flanges to post and bolt to metal supporting surfaces.

3.5 ATTACHING RAILINGS

- A. Anchor railing ends at walls with round flanges anchored to wall construction and welded to railing ends
- B. Anchor railing ends to metal surfaces with flanges welded to railing ends.
- C. Attach railings to wall with wall brackets, except where end flanges are used. Provide brackets with 1-1/2-inch clearance from inside face of handrail and finished wall surface. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.
 - 1. Use type of bracket with flange tapped for concealed anchorage to threaded hanger bolt.
 - 2. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.
- D. Secure wall brackets and railing end flanges to building construction as follows:
 - 1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.

2. For hollow masonry anchorage, use toggle bolts.
3. For wood stud partitions, use hanger or lag bolts set into studs or wood backing between studs. Coordinate with carpentry work to locate backing members.
4. For steel-framed partitions, use hanger or lag bolts set into fire-retardant treated wood backing between studs. Coordinate with stud installation to locate backing members.
5. For steel-framed partitions, use self-tapping screws fastened to steel framing or to concealed steel reinforcements.
6. For steel-framed partitions, use toggle bolts installed through flanges of steel framing or through concealed steel reinforcements.

3.6 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed 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 Division 09 painting Sections.
- C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

3.7 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 05530

GRATING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Metal bar gratings.
- 2. Extruded-aluminum plank gratings.
- 3. Metal frames and supports for gratings.

B. Related Sections:

- 1. Division 05 Section "Structural Steel Framing" for structural-steel framing system components.
- 2. Division 05 Section "Metal Stairs" for grating treads and landings of steel-framed stairs.
- 3. Division 05 Section "Pipe and Tube Railings" for metal pipe and tube handrails and railings.

1.3 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design gratings, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Structural Performance: Gratings shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated.
 - 1. Walkways and Elevated Platforms Other Than Exits: Uniform load of 60 lbf/sq. ft. (2.87 kN/sq. m) or concentrated load of 1200 lbf, whichever produces the greater stress.
 - 2. Limit deflection to $L/360$ or 1/4 inch (6.4 mm), whichever is less.
- C. Seismic Performance: Provide gratings capable of withstanding the effects of earthquake motions determined according to ASCE/SEI 7.

1.4 ACTION SUBMITTALS

- A. Product Data: For the following:

1. Metal bar gratings.
2. Extruded-aluminum plank gratings.
3. Clips and anchorage devices for gratings.

B. Shop Drawings: Include plans, sections, details, and attachments to other work.

C. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified professional engineer.

B. Mill Certificates: Signed by manufacturers of stainless-steel sheet certifying that products furnished comply with requirements.

C. Welding certificates.

1.6 QUALITY ASSURANCE

A. Metal Bar Grating Standards: Comply with NAAMM MBG 531, "Metal Bar Grating Manual."

B. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum. "

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with gratings by field measurements before fabrication.

1.8 COORDINATION

A. Coordinate installation of anchorages for gratings, grating frames, and supports. 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.

PART 2 - PRODUCTS

2.1 FERROUS METALS

A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

- B. Steel Bars for Bar Gratings: ASTM A 36/A 36M or steel strip, ASTM A 1011/A 1011M or ASTM A 1018/A 1018M.
- C. Wire Rod for Bar Grating Crossbars: ASTM A 510 (ASTM A 510M).
- D. Galvanized-Steel Sheet: ASTM A 653/A 653M, structural quality, Grade 33 (Grade 230), with G90 (Z275) coating.

2.2 ALUMINUM

- A. Aluminum, General: Provide alloy and temper recommended by aluminum producer for type of use 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 Shapes: ASTM B 221 (ASTM B 221M), alloys as follows:
 - 1. 6061-T6 or 6063-T6, for bearing bars of gratings and shapes.
 - 2. 6061-TI, for grating crossbars.

2.3 FASTENERS

- A. General: Unless otherwise indicated, provide Type 316 stainless-steel fasteners for interior and exterior use. Select fasteners for type, grade, and class required.
 - 1. Provide stainless-steel fasteners for fastening aluminum.
- B. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, nuts, and, where indicated, flat washers; ASTM F 593 (ASTM F 738M) for bolts and ASTM F 594 (ASTM F 836M) for nuts, Alloy Group 2 (A4).
- C. Anchor Bolts: Stainless-steel bolts, nuts, and flat washers; ASTM F 593 (ASTM F 738M) for bolts and ASTM F 594 (ASTM F 836M) for nuts.
- D. Plain Washers: Round, ASME B18.22.1 (ASME 1318.22M).
- E. Lock Washers: Helical, spring type, ASME B18.21.1 (ASME 1318.21.2M).
- F. Post-Installed Anchors: Chemical 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, conducted by a qualified independent testing agency.
 - 1. Material for Interior and Exterior Locations and Where Stainless Steel is Indicated: Alloy Group 2 (A4) stainless-steel bolts, ASTM F 593 (ASTM F 738M), and nuts, ASTM F 594 (ASTM F 836M).

2.4 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy that is welded.
- B. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- C. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.5 FABRICATION

- A. Shop Assembly: Fabricate grating sections in shop to greatest extent possible to minimize field splicing and assembly. 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 material cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form from materials of size, thickness, and shapes indicated, but not less than that needed to support indicated loads.
- D. Fit exposed connections accurately together to form hairline joints.
- E. Welding: Comply with AWS recommendations and 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.
- F. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space the anchoring devices to secure gratings, frames, and supports rigidly in place and to support indicated loads.
 - 1. Fabricate toeplates for attaching in the field.
 - 2. Toeplate Height: 4 inches (100 mm) unless otherwise indicated.

2.6 METAL BAR GRATINGS

- A. Manufacturers: Subject to compliance with requirements. :
- B. Welded Steel Grating MBG-I :
 - 1. Bearing Bar Spacing: 11/16 inch (17 mm) o.c.
 - 2. Bearing Bar Depth: 2 inches (51 mm) and as required to comply with structural performance requirements.
 - 3. Bearing Bar Thickness: 3/16 inch (4.8 mm) and as required to comply with structural performance requirements.
 - 4. Crossbar Spacing: 2 inches (51 mm) o.c.

5. Steel Finish: Hot-dip galvanized with a coating weight of not less than 1.8 oz./sq. ft. (550 g/sq. m) of coated surface.
- C. Removable Grating Sections: Fabricate with banding bars attached by welding to entire perimeter of each section. Include anchors and fasteners of type indicated or, if not indicated, as recommended by manufacturer for attaching to supports.
1. Provide no fewer than four weld lugs for each grating section composed of rectangular bearing bars 3/16 inch (4.8 mm) or less in thickness and spaced less than 15/16 inch (24 mm) o.c., with each lug shop welded to three or more bearing bars. Interrupt intermediate bearing bars as necessary for fasteners securing grating to supports.
 2. Furnish galvanized malleable-iron flange clamp with galvanized bolt for securing grating to supports. Furnish as a system designed to be installed from above grating by one person.
 - 1) Products: Subject to compliance with requirements.
- D. Fabricate cutouts in grating sections for penetrations indicated. Arrange cutouts to permit grating removal without disturbing items penetrating gratings.
1. Edge-band openings in grating that interrupt four or more bearing bars with bars of same size and material as bearing bars.
- E. Do not notch bearing bars at supports to maintain elevation.

2.7 EXTRUDED-ALUMINUM PLANK GRATINGS

- A. Manufacturers: Subject to compliance with requirements.
- B. Provide extruded-aluminum plank gratings in type, size, and finish indicated or, if not indicated, as recommended by manufacturer for indicated applications and as needed to support indicated loads.
1. Type: Extruded-aluminum planks approximately 6 inches (152 mm) wide with multiple flanges approximately 1.2 inches (30 mm) o.c., acting as bearing bars connected by a web that serves as a walking surface. Top surface has raised ribs to increase slip resistance.
 2. Depth: 2 inches (51 mm) and as required to comply with structural performance requirements.
 3. Perforations: Rectangular, 19/32 by 3 inches (15 by 76 mm), with adjacent rows staggered.
 4. Finish: Mill finish, as fabricated.
- C. Fabricate cutouts in grating sections for penetrations indicated. Arrange cutouts to permit grating removal without disturbing items penetrating gratings.

2.8 GRATING FRAMES AND SUPPORTS

- A. Frames and Supports for Metal Gratings: Fabricate from metal shapes, plates, and bars of welded construction to sizes, shapes, and profiles indicated and as necessary to receive gratings. Miter and weld connections for perimeter angle frames. Cut, drill, and tap units to receive hardware and similar items.

1. Unless otherwise indicated, fabricate from same basic metal as gratings.
 2. Equip units indicated to be cast into concrete or built into masonry with integrally welded anchors. Unless otherwise indicated, space anchors 24 inches (600 mm) o.c. and provide minimum anchor units in the form of steel straps 1-1/4 inches (32 mm) wide by 1/4 inch (6 mm) thick by 8 inches (200 mm) long.
- B. Galvanize steel frames and supports in the following locations:
1. Exterior.

2.9 STEEL FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish gratings, frames, and supports after assembly.
- C. 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.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing gratings to in-place construction. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.
- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing gratings. Set units accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.
- C. Provide temporary bracing or anchors in formwork for items that are to be built into concrete or masonry.
- D. Fit exposed connections accurately together to form hairline joints.
 1. 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 the surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- E. Attach toeplates to gratings by welding at locations indicated.
- F. 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.

1. Remove welding flux immediately.

G. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

3.2 INSTALLING METAL BAR GRATINGS

A. General: Install gratings to comply with recommendations of referenced metal bar grating standards that apply to grating types and bar sizes indicated, including installation clearances and standard anchoring details.

B. Attach removable units to supporting members with type and size of clips and fasteners indicated or, if not indicated, as recommended by grating manufacturer for type of installation conditions shown.

C. Attach nonremovable units to supporting members by welding where both materials are same; otherwise, fasten by bolting as indicated above.

3.3 INSTALLING METAL PLANK GRATINGS

A. General: Comply with manufacturer's written instructions for installing gratings. Use manufacturer's standard anchor clips and hold-down devices for bolted connections.

B. Attach aluminum units to steel or aluminum supporting members by bolting at side channels at every point of contact and by bolting intermediate planks at each end on alternate sides. Bolt adjacent planks together at midspan.

3.4 ADJUSTING AND CLEANING

A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION

DIVISION 11
EQUIPMENT

SECTION 11310

PLANT WATER BOOSTER PUMPS

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. The Contractor shall furnish and install skid mounted packaged booster pump system with pumps, control panel and accessories as indicated on the Drawings and specified herein.
 - 1. Supply one (1) packaged plant water system as described herein. Packaged plant water system shall include pumps, motor's, VFD's, piping, valves, and control panel.
- B. The supplier of the booster pump system shall be responsible for the proper performance of the system. All equipment shall perform as specified and the completed installation shall operate in accordance with the requirements of the Drawings and Specifications for this project.
- C. The booster pump system with controls and appurtenances shall be provided by the same supplier.

1.2 REFERENCE STANDARDS

- A. The work in this section is subject to the requirements of applicable portions of the following standards:
 - 1. Hydraulic Institute
 - 2. ANSI – American National Standards Institute
 - 3. ASTM – American Society for Testing and Materials
 - 4. IEEE – Institute of Electrical and Electronics Engineers
 - 5. NEMA – National Electrical Manufacturers Association
 - 6. NEC – National Electrical Code
 - 7. ISO – International Standards Organization
 - 8. UL – Underwriters Laboratories, Inc.

1.3 SUBMITTALS

- A. Submit manufacturer's shop drawings, product data, operation and maintenance manuals, and installation instructions under the provisions of Section of 01300.
- B. Shop Drawings: Provide dimensioned drawings which indicate in large scale detail, fabricated project specific equipment showing construction methods, and component assembly and location in plan and cross section, mounting requirements and clearances, and utility requirements as to types, sizes, and locations. For electrical and signal requirements, indicate service connections, characteristics, and wiring diagrams.
- C. Product Data: Provide pump performance curves, electrical motor data, equipment description, pump controller characteristics, dimensions and construction, equipment capacities, characteristics and limitations, materials, finishes, utility requirements and locations. Provide a

performance chart showing curves for torque, current, power factor, input/output KW, efficiency and data on starting and no load characteristics.

- D. Manufacturer's Installation Instructions: Indicate installation requirements and special procedures.
- E. Operation and Maintenance Manuals: Submit under the provisions of Sections 01300 and 01700.

1.4 SCHEDULING AND COORDINATION

- A. Schedule Work under the provisions of Section 01310.
- B. Coordinate the delivery and installation of the Work of this Section with the Work of other Sections.

1.5 . QUALITY ASSURANCE

- A. Perform work in accordance with Section 01400.
- B. Materials and installation shall conform to manufacturer's specifications and instructions.
- C. The booster pump system, controls and accessories shall be from the same supplier in order to achieve standardization of operation, maintenance, spare parts, manufacturer's service and warranty.
- D. Provide services of an authorized manufacturer's representative for on-site assistance and instruction during installation and start-up.
- E. Contractor shall verify dimensions in the field before ordering equipment.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, protect and handle equipment according to manufacturer's instructions and the provisions of Sections 01600 and 01610.
- B. Coordinate the delivery and installation of the work of this section with the work of other sections.

1.7 OPERATION AND MAINTENANCE DATA

- A. Submit under provisions of Sections 01300 and 01700.
- B. The manufacturer shall provide a detailed manual that includes specific instructions for receiving and handling, assembly, wiring, installation, operation, repair and service, storage, troubleshooting, detailed exploded drawings of the unit, and a full parts list.
- C. The manual shall include periodic maintenance requirements and schedules.

1.8 WARRANTY

- A. The Contractor shall provide a one year warranty which begins at Final Completion for defects in materials and workmanship in accordance with Sections 01700 and 01740.
- B. The manufacturer shall provide a warranty against any defect or malfunction in materials and workmanship for a period of one year which begins when the equipment is put into service in accordance with Sections 01700 and 01740.
- C. A written manufacturer's warranty shall be supplied.
 - 1. The warranty period shall be a non-prorated period of 24 months from date of installation, not to exceed 30 months from date of manufacture.

1.9 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of Sections 01700 and 01720.
- B. Record actual locations of pipes, utilities, equipment and accessories.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. To provide single source responsibility, the booster pump system including pumps, controls, piping and appurtenances for this project shall be provided by the same manufacturer.
- B. Subject to Compliance with requirements provide products by one of the following
 - 1. HPIC-3656 Water pressure booster system, by Hayes Pump Inc.
 - 2. Equal product, subject to compliance with requirements.

2.2 VARIABLE SPEED PACKAGED MANUFACTURED BOOSTER PUMP SYSTEM

- A. Furnish and install a pre-fabricated and tested variable speed packaged pumping system to maintain constant water delivery pressure. System shall include;
 - 1. Three (3) Goulds Close Coupled End Suction Pumps, Model 22BF
 - 2. Three (3) 5 Horsepower, 3500 RPM, 230/460 Volt, 3 Phase, 60 Hertz TEFC Electric Motors
 - 3. Three (3) Allen-Bradley 5 Horsepower 460 Volt Variable Frequency Drive (VFD) with NEMA 1 Disconnects.
 - 4. One (1) 30 Amp Single Point NEMA 4 Disconnect.
 - 5. One (1) Custom Booster Pump NEMA 4 Controller.
 - 6. Fabricated Steel
- B. System shall be capable of automatically providing a minimum system pressure of 70 psig while at a flow rate of from 40 gpm to 100 gpm with a suction pressure of 0 psig minimum, 10 psig

maximum. Booster system shall consist of three end suction centrifugal pumps with a rated flow of 50 gpm at 162 feet of head (70 psi). Two pumps shall operate at any time with the third acting as a spare.

- C. The packaged pump system shall be a standard product of a single pump manufacturer. The entire pump system including pumps and pump logic controller, shall be designed and built by the same manufacturer.
- D. The complete packaged water booster pump system shall be certified and listed by UL (Category QCZJ – Packaged Pumping Systems) for conformance to U.S. standards.

2.3 PUMPS

- A. The pump units shall be of one manufacturer and provide complete including electric motor drive. Production performance testing conducted by manufacturer on each pump unit using motor. Head shut off and a minimum of two operating points will be measured at operating speed to verify performance.
- B. Pumps shall be Goulds 3656 S Group, Model 22BF single stage horizontal close-coupled end suction centrifugal pumps or approved equal.
- C. Pump casing shall be a spiral volute type with back pull out design with a tangentially oriented discharge nozzle and casing drain with a steel or brass pipe plug.
- D. The suction/discharge connections shall be up to 2-1/2” size with NPT threaded connections.
- E. A replaceable suction wear ring shall be provided and held securely by means of an interference fit in the casing suction.
- F. Pump impeller shall be of enclosed design and key driven. A stainless-steel cap screw and washer shall provide positive attachment of the impeller to the motor shaft.
- G. Seal housing shall hold the stationary seat of the mechanical shaft seal. The seal housing shall be held in place in a machined fit on the pump casing to maintain component alignment and ‘O-ring’
- H. A rigid motor adaptor of ASTM A48 CL20 cast iron construction shall support the pump liquid end and maintain pump to motor alignment. A bottom port shall be provided to allow condensation or seal leakage to drain and not be retained within the adaptor. The power frame adaptor shall be an integral 1-piece design with the seal housing.
- I. Pump shaft seal shall be a John Crane Type 21 constructed of the following materials
 - 1. Stationary Face: Ceramic
 - 2. Rotating Face: Carbon
 - 3. Elastomers: Buna N
 - 4. Mechanical Seal: 316 Stainless Steel
- J. Pump Construction:
 - 1. Casing: Cast iron, ASTM A48 Class 20B
 - 2. Casing Wear Ring: Bismuth Brass

3.	Seal Housing:	Cast Iron ASTM A48 Class 30
4.	Adapter:	Cast Iron ASTM A48 Class 30
5.	Impeller:	Silicon Bronze, ASTM B584, C87500
6.	Shaft	AISI 1045 Steel
7.	Shaft Sleeve	AISI Type 303 Stainless Steel

- K. Motor maximum HP rating shall be 5 HP. Motor shall be rated for operation on 460 volt, 3 phase service at 3500 RPM. See Part 2.4 for requirements for the variable frequency drive motors.
- L. Electric drive motor shall be non-overloading of NEMA standard design with JM shaft extension and C-Face mounting suitable for close coupled pump mounting. Motor shall be Totally enclosed, fan cooled (TEFC) with Class F insulation with a temperature rise no higher than Class B.
- M. Motor service factor shall be 1.15 and maintain High Efficiency

2.4 VARIABLE FREQUENCY DRIVE MOTORS

- A. The VFD shall be of the PWM (Pulse Width Modulation) design using current IGBT (Insulated Gate Bipolar Transistor) technology.
- B. The VFD shall convert incoming fixed frequency three-phase AC power into a variable frequency and voltage for controlling the speed of motor. The motor current shall closely approximate a sine wave. Motor voltage shall be varied with frequency to maintain desired motor magnetization current suitable for centrifugal pump control and to eliminate the need for motor de-rating.
- C. The VFD shall utilize an energy optimization algorithm to minimize energy consumption. The output voltage shall be adjusted in response to the load, independent of speed.
- D. The VFD shall automatically reduce the switching frequency and/or the output voltage and frequency to the motor during periods of sustained ambient temperatures that are higher than the normal operating range. The switching frequency shall be reduced before motor speed is reduced.
- E. An integral RFI filter shall be standard in the VFD.
- F. The VFD shall have a minimum of two skip frequency bands which can be field adjustable.
- G. The VFD shall have internal solid-state overload protection designed to trip within the range of 125-150% of rated current.
- H. The VFD shall have, as a minimum, the following input/output capabilities:
 - 1. Speed Reference Signal: 0-10 VDC, 4-20 mA
 - 2. Digital remote on/off
 - 3. Fault Signal Relay (NC or NO)
 - 4. Fieldbus communication port (RS485)
- I. The cooling design of the VFD shall be such that a Class B motor temperature rise is not exceeded at full rated load and speed at a minimum switching frequency of 9.0 kHz.

2.5 CONTROL PANEL AND PUMP SYSTEM CONTROLLER

- A. The pump system controller shall be a standard product developed and supported by the pump manufacturer. The custom controller by Hayes Pump or approved equal.
- B. The pump system control panel enclosure shall be NEMA 4. Incoming power shall be 460 volt, 3 phase.
- C. Pump controller to have Internal Webserver and Communication with External RJ45 to allow end users to view all alarms and setting through a standard internet connection without special software. Allows end user to determine an IP address to view any screen from a standard internet connection
- D. HMI touch screen Controller
 1. Shall be UL listed 5.7" color touch screen controller to control all pump starts and stops and indicate alarm and or fault conditions.
 2. Shall have enclosure dimensions of 16"h x 12"w x 8"d
- E. The controller shall have the following features:
 1. Selectable pump sequencing on same controller
 2. Non-volatile internal memory to prevent program loss due to power failure
 3. Power Off/On Switch
 4. Auto Detect – specialized internal software to automatically and continually determine the optimal start and stop speed of each pump to ensure lowest possible kW and water usage. Feature will eliminate pump cycling automatically
 5. Auto Commission- specialized internal software to automatically calibrate the booster to meet the buildings demand profile, obey customer selected operating conditions. Software will also determine no flow without use of separate sensor. Feature will eliminate specialized start-up personal and ensure booster is operating at best efficiency to meet customers set points
 6. External Fault and Alarm inputs, (4) - User selectable
 7. Relay Outputs (6 amp, form 'C') fault and alarm, (4) - User selectable
 8. Complete preventative maintenance notification based upon life expectancy of pump, motor, VFD, PLC and transducers
 9. Control power light, pulsating audiovisual alarm system
 10. Complete VFD access on controller HMI to allow operator to run pumps in manual at desired frequency
 11. User selectable reaction to specific alarm
 - a. Transducer failure or loss of signal = shutdown or maintain a selectable max speed for all pumps
 - b. Alarms can be set to shut down after a determined number of faults within "X" hrs
 - c. Help buttons available on touchscreen to provide the customer additional support
- F. Electrical
 1. Pump controller to be UL Listed.
 2. Conduit between motors and VFD to be liquid-tight flexible metallic type.
 3. Conduit between VFD and Single Point Disconnect to be liquid-tight flexible metallic type.

4. Single Point Disconnect enclosure and base pan shall be Nema 4 and shall house all main disconnect with external operating handle and include control power transformer and other necessary controls.
5. All of the electrical components shall be factory wired and tested by the pump system manufacturer in accordance with the provisions of the National Electrical Code. All control wires shall be individually numbered and each component shall be labeled accordingly. All internal wiring shall be copper stranded, A.W.G. with a minimum insulation of 90o C. Manufacturer shall certify the complete power and control assembly with the UL mark for Industrial Control panels.

2.6 SEQUENCE OF OPERATION

- A. The system controller shall operate equal capacity variable speed pumps to maintain a constant discharge pressure (system set-point). The system controller shall receive an analog signal [4-20mA] from the factory installed pressure transducer on the discharge manifold, indicating the actual system pressure. As flow demand increases the pump speed shall be increased to maintain the system set-point pressure. When the operating pump(s) reach 96% of full speed (adjustable), an additional pump will be started and will increase speed until the system set-point is achieved. When the system pressure is equal to the system set-point all pumps in operation shall reach equal operating speeds. As flow demand decreases the pump speed shall be reduced while system set-point pressure is maintained. When all pumps in operation are running at low speed the system controller shall switch off pumps when fewer pumps are able to maintain system demand.
- B. The system controller shall be capable of switching pumps on and off to satisfy system demand without the use of flow switches, motor current monitors or temperature measuring devices.
- C. All pumps in the system shall alternate automatically based on demand, time and fault. If flow demand is continuous (no flow shut-down does not occur), the system controller shall have the capability to alternate the pumps every 24 hours, every 48 hours or once per week. The interval and actual time of the pump change-over shall be field adjustable.

2.7 SYSTEM CONSTRUCTION

- A. Centrifugal pumps shall be manifolded together in suction and discharge manifolds with 4" diameter headers and 2" pump branch lines. Manifold connection sizes shall be 4" grooved.
- B. Branch isolation valves shall be provided on the suction and discharge of each pump. Isolation valve sizes shall be full port ball valves.
- C. A spring-loaded non-slam type check valve shall be installed on the discharge of each pump. The valve shall be a wafer style type fitted between two flanges. Check valves shall have a POM composite body and poppet, a stainless steel spring with EPDM or NBR seats.
- D. Connection for diaphragm tank shall be 2.0" NPT.
- E. A pressure transducer shall be factory installed on the discharge manifold. Pressure transducers shall be made of 316 stainless steel. Transducer accuracy shall be +/- 1.0% full scale with hysteresis and repeatability of no greater than 0.1% full scale. The output signal shall be 4-20 mA with a supply voltage range of 9-32 VDC.

- F. A water shortage protection device shall be included on the suction manifold to prevent the pumps from running dry.
- G. A bourdon tube pressure gauge, 2.5 inch diameter, shall be placed on the suction and discharge manifolds. The gauge shall be liquid filled and have copper alloy internal parts in a stainless steel case. Gauge accuracy shall be 2/1/2 %. The gauge shall be capable of a pressure of 30% above its maximum span without requiring recalibration.
 - 1. Suction Gauge Pressure Range: 0 - 150PSI
 - 2. Discharge Gauge Pressure Range: 0 - 300 PSI
- H. The base frame shall be constructed of fabricated carbon steel. Structural members shall be painted in acrylic enamel with a minimum thickness of 3 mils.
- I. Rubber vibration dampers shall be fitted between each pumps and base frame to minimize vibration.
- J. Standard production equipment valves, and fittings shall have factory finish. Bolts to be zinc plated.

2.8 HYDROPNEUMATIC TANK

- A. Tank shall be an ASME rated full acceptance bladder type steel pressure tank. Tanks volume shall be up to 158 gallons. Tank shall be rated for a working pressure capacity of 150 psig.
- B. Tank shall be standard with a heavy-duty butyl replaceable bladder with a minimum thickness of 0.1 inch.
- C. Tank bottom shall have a 2 inch malleable iron NPTF connection fitting.

2.9 TESTING

- A. The entire pump station shall be factory performance tested as a complete unit prior to shipment. Job-site programming shall be entered into the controller prior to shipment (details of installation requirements shall be communicated to the pump system manufacturer).
- B. System shall be performance tested for project specific conditions. A verified performance test report shall be provided by the manufacturer.
- C. The system shall undergo a hydrostatic test prior to shipment. System to be tested at 200 Psi for 5 minutes.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Coordinate the work of this section with the work of other sections.

- B. Verify that site conditions are ready to receive the work of this section.
- C. Verify that required utilities are available and in correct locations.
- D. Verify dimensions and clearances in the field prior to installation to ensure proper fitting and operation of equipment.

3.2 INSTALLATION

- A. Contractor shall perform all field wiring and other utility connections as required by manufacturer to provide a complete working system.
- B. Install all submersible pumps and appurtenances in accordance with Drawings, manufacturer's instructions and Sections 01400 and 01610.
- C. Furnish all accessories and components as required to provide a complete working system in accordance with manufacturer's recommendations.
- D. The manufacturer shall provide assistance and inspection of installed equipment for proper operation as described in Sections 01400 and 01610.
- E. Manufacturer's representative shall make all final adjustments for proper operation in accordance with Section 01610.

3.3 INITIALSTART-UP

- A. After the installation is complete, a qualified factory representative shall place the pumps, controls and accessories in operation, conduct a complete function check, and make all necessary adjustments for regular service in accordance with Sections 01400 and 01610.
- B. Manufacturer's representative shall certify in writing that equipment is installed and operating as specified and in accordance with the manufacturer's recommendations.

3.4 TESTING AND DEMONSTRATION

- A. Start-up, test and demonstrate equipment in accordance with Sections 01400 and 01610. Contractor shall provide water for testing and demonstration.
- B. After the pumps have been completely installed and wired, the manufacturers' representative shall perform the following:
 - 1. Megger stator and power cables.
 - 2. Check seal lubrication.
 - 3. Check for proper rotation.
 - 4. Check power supply voltage.
 - 5. Measure motor operating load and no load current.
 - 6. Check level control operation and sequence.
- C. Provide instruction to Owner in accordance with Section 01610.

END OF SECTION

SECTION 11342
GRIT REMOVAL EQUIPMENT

PART 1 - GENERAL

1.1 SCOPE

- A. Work described in this section includes furnishing all labor, equipment, materials, tools and incidentals required for a complete and operable installation of the grit removal system as shown on the drawings and specified herein. The manufacturer shall supply the equipment and the general contractor shall install the equipment.

1.2 DESIGN REQUIREMENTS

- A. The Grit Removal and Dewatering System shall:
1. Remove 90% to 95% of all grit particles with specific gravity of 2.65 greater than or equal to 150 micron at a total peak design flow of 14.0 mgd.
 2. Remove 90% to 95% of all grit particles with specific gravity of 2.65 greater than or equal to 106 micron at the average design flow of 4.75 mgd.
- B. The Grit Removal System shall be comprised of the following components:
1. Grit Separator
 2. Grit Pump
 3. Grit Classifier
 4. Control Panel
- C. The Grit Separator shall consist of internal components installed into a concrete tank to receive the incoming screened flow. The Grit Separator shall remove the specified grit particles from the specified peak flow and collect them in a sump at the bottom of the unit. The de-gritted effluent from the Grit Separator shall be discharged via an overflow channel as shown on the drawings.
- D. The Grit Separator shall be all-hydraulic, self-activating and shall not require instrumentation, internal moving parts or external power.
- E. The Grit Separator shall be self-cleaning and consist of corrosion resistant components.
- F. The Grit Pump shall convey the concentrated grit slurry from the underflow of the Grit Separator to the Grit Classifier.
- G. The Grit Removal System and all appurtenances shall be supplied by a single supplier. Piping to/from the Grit Pump and Grit Classifier shall be provided by the Contractor.

- H. The system to be furnished hereunder shall be made by a manufacturer regularly engaged in such work and who has furnished similar installations and had them in successful and continuous operation for a minimum period of ten years.
- I. Data on performance testing, service history and operation of existing installations using the submitted equipment shall be made available to the Engineer, upon request, for use in determining that the Grit Removal System offered meets the intent of the contract, performance requirements and criteria stated in these specifications.
- J. The Grit Separator technology shall be designed utilizing Computational Fluid Dynamics (CFD) and field data to verify its flow regime, headloss and grit removal characteristics. Upon request, data on the computation methods used and generic simulation results shall be made available to the engineer.
- K. Grasshoppers, reciprocating rakes and similar type of units shall not be accepted.
- L. Units without an internal dip plate with annulus baffle plate to modify the flow pattern shall not be accepted.
- M. Units using Apex valves shall not be accepted.
- N. Equipment using paddles or air to supplement or induce a vortex shall not be accepted.

1.3 SUBMITTALS AND OPERATION AND MAINTENANCE MANUALS

- A. Submittals shall be provided in accordance with Section 01300 and shall include at a minimum the following:
 - 1. Manufacturer's catalog data and descriptive literature including equipment weights and performance data.
 - 2. General arrangement and dimensional drawings of the grit removal system.
 - 3. Written recommended procedures for job site storage, handling, and installation of the equipment.
- B. Operation and maintenance manuals shall be provided in accordance with the Sections 01300 and 01700. The manuals shall at a minimum include the following data:
 - 1. Alignment, adjustment, and repair instructions.
 - 2. MANUFACTURER'S installation instructions
 - 3. Assembly diagrams.
 - 4. Troubleshooting guide.
 - 5. Lubrication instructions.
 - 6. Recommended spare parts lists and predicted life of parts subjected to wear.

1.4 QUALITY ASSURANCE

- A. Perform work in accordance with Section 01400.
- B. Materials and installation shall conform to manufacturer's specifications and instructions.

- C. The grit system components and accessories shall be from the same supplier in order to achieve standardization of operation, maintenance, spare parts, manufacturer's service and warranty.
- D. Provide services of an authorized manufacturer's representative for on-site assistance and instruction during installation and start-up.
- E. Contractor shall verify dimensions in the field before ordering equipment.
- F. The system shall be furnished by a MANUFACTURER who complies with the requirements of the ISO 9001 Quality.
- G. MANUFACTURER shall be successful in the experience of manufacture, operation, and servicing of Grit Removal Systems of type, size, quality, performance, and reliability equal to that specified for a period of not less than ten (10) years. The MANUFACTURER shall submit evidence of experience having supplied a minimum of ten (10) installations in North America of similar size to the proposed system.
- H. If equipment other than that shown on the Drawings is submitted to the Engineer for consideration as an equal, it shall be the responsibility of the MANUFACTURER requesting approval to submit with the request a revised design and layout of the mechanical equipment acceptable to the ENGINEER. Revised drawings shall show the proposed location of the alternate unit, and area required for withdrawal space of replacement or serviceable components. This drawing shall also show clearances of adjacent equipment and service area required by that equipment. Changes in architectural, structural, electrical, mechanical and plumbing requirements for the alternate shall be the responsibility of the Manufacturer requesting approval. This shall include the cost of redesign by affected designers. Any additional cost incurred by affected subcontractors shall be the responsibility of the MANUFACTURER and not the OWNER.
- I. Approved equal MANUFACTURERS shall furnish performance test results documenting that the System has achieved the specified performance requirement. Performance test reports must clearly show the performance of the entire grit removal system, including grit washing and/or dewatering units.

1.5 SCHEDULING AND COORDINATION

- A. Schedule Work under the provisions of Section 01310.
- B. Coordinate the delivery and installation of the Work of this Section with the Work of other Sections.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, protect and handle equipment according to manufacturer's instructions and the provisions of Sections 01600 and 01610.
- B. Coordinate the delivery and installation of the work of this section with the work of other sections.

1.7 WARRANTY

- A. The Contractor shall provide a one-year warranty for defects in materials and workmanship in accordance with Sections 01700 and 01740.
- B. The manufacturer shall provide a one-year warranty against any defect or malfunction due to workmanship in the equipment and materials in accordance with Sections 01700 and 01740.
- C. A written manufacturer's warranty shall be supplied.
- D. Certificate of Compliance - The MANUFACTURER shall warrant that the Grit Removal System which was supplied was manufactured in strict compliance with the Contract Specifications.

1.8 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of Section 01720.
- B. Record actual locations of pipes, utilities, equipment and accessories

PART 2 - PRODUCTS

2.1 GRIT SEPARATOR

- A. Design Data
 - 1. Number of units: 1
 - 2. Size: 20' Diameter
 - 3. Configuration: In Situ
 - 4. Performance (Peak Flow): 95% Removal of all grit (specific gravity 2.65) ≥ 150 Microns at peak flow.
 - 5. Performance (Average Flow): 95% Removal of all grit (specific gravity 2.65) ≥ 106 Microns at average flow.
 - 6. Performance (Average Flow): 95% Removal of all grit (specific gravity 2.65) ≥ 75 Microns at daily flow.
 - 7. Daily Flow/Unit: 2.5 M.G.D. with nor more than 1" headloss
 - 8. Average Flow/Unit: 4.75 MGD with no more than 1" headloss
 - 9. Peak Flow/Unit: 14.0 MGD with 8" headloss
 - 10. Depth of flow Peak/Average/Daily: 13"/7"/5"
 - 11. Underflow Rate: 400 GPM
 - 12. Influent Connection: 30" Flanged Pipe
 - 13. Effluent Connection: 60" wide channel
 - 14. Underflow Layout: Submersible Pump
 - 15. NPW Connection: 2" NPT
 - 16. Internal Component Material: 304SS
 - 17. Support Frame Material: Galvanized Mild Steel
- B. Operation

1. The Grit Separator shall be designed to separate grit and sand from screened raw wastewater using hydrodynamic separation and boundary layer effects to aid gravitational forces.
2. All flow passages shall be self-cleaning and free of sharp projections or fittings that may snag stringy or fibrous materials.
3. The Grit Separator shall be characterized by a predetermined flow path caused by the vessel geometry and flow modifying components to maximize the concentration and removal of settleable solids.
4. The Grit Separator shall include a fluidizing system to prevent the collected grit from compacting in the collection area, release entrapped organics, and aid in transporting the accumulated grit to the Grit Dewatering Unit.

C. Construction

1. The Grit Separator shall consist of a circular concrete chamber constructed by the CONTRACTOR. The base of the chamber shall be sloped towards the grit collection area located in the chamber sump.
2. The tangential inlet pipe shall be cast into the chamber as shown on the contract
3. drawings.
4. The internal components of the Grit Separator shall consist of a dip plate with annulus baffle plate and overflow channel and a center shaft and cone fabricated from stainless steel.
5. The center shaft and cone shall be mounted so that its edge is clear of the sloping base
6. of the vessel. It shall be removable from the top of the unit.
7. All suspended components shall be attached to a support frame anchored to the concrete chamber walls.
8. A stainless steel fluidizing ring shall be mounted to the floor of the grit collection
9. under the cone.
10. All flanges shall conform to ANSI B16.1 bolt patterns.

D. Valves and Accessories

1. The Grit Separator shall be supplied with the following valves:
 - a. One (1) 2" NEMA 4X bronze solenoid valve to automate the fluidizing water supply.
 - b. One (1) 2" brass pressure regulator to adjust the fluidizing water pressure.
 - c. Two (2) 2" bronze ball valves to shut off the fluidizing water and isolate the solenoid valve.
2. One (1) 0-100 psig pressure gauge shall be provided for the grit removal system to monitor the fluidizing water delivery pressure.

2.2 GRIT PUMP

- A. Provide a submersible wet pit vortex-type slurry pump capable of delivering 400 gpm at 41' Total Dynamic Head (TDH). The pump shall be 4xll Model CLCESR with 10.5 inch impeller as manufactured by WEMCO, equal pump by Hayward Gordon, or approved equal.
- B. The pump shall be of a design and manufacture that has been used in at least five installations in which identically sized equipment has provided satisfactory performance for a minimum of five

(5) years in a similar application. The pump manufacturer shall comply with the requirements of the ISO 9001 Quality and ISO 14001.

- C. The pump complete with submersible motor, fastout, Hi-Chrome iron base elbow and lifting yoke, and all other specified accessories and appurtenances shall be furnished by the pump manufacturer to insure compatibility and integrity of the individual components, and provide the specified warranty for all components
- D. The pump shall be designed for continuous operation with a fully recessed impeller mounted completely out of the flow path between the pump inlet and discharge connections so that solids are not required to flow through the impeller. All flow path clearances within the pump shall be equal to or greater than the discharge diameter, so that all solids which will pass through the discharge will pass through the pump.
- E. The untrimmed impeller shall be of the cup-type design such that blade ends are surrounded by an integral rim which shall direct the flow to the center of the volute, minimizing particle impact and reducing wear.
 - 1. The impeller shall be specifically designed to pump grit slurries and shall have no less than 10 vanes, each of minimum of 5/16 inches of the specified material and be trimmed to meet the condition points as specified. Pump- out vanes on the rear shroud of the impeller are not acceptable.
 - 2. The hydraulic design shall be such that the length of the impeller vane increases as wear occurs to the rim, allowing as new or better pumping performance throughout the wear cycle of the impeller.
- F. The single piece casing thickness shall be a minimum of 3/4" with normal casting tolerances, and of centerline discharge to ensure that the pump and motor will be centered on and provide maximum clamping force to the base elbow installed in the wet-well. Pumps shall be equipped with slotted raised-face flanges to receive 125 lb. standard bolting, and special case slots shall be cast in to retain bolts and fasten the motor adapter for easy case removal. A removable wearplate of Hi-Chrome iron shall be provided back of the impeller designed to direct flow from behind the impeller to the center of the volute for maximum protection to the casing.
- G. The parts exposed to abrasive wear - case, impeller and wearplate - shall be of all Hi-Chrome iron material conforming to ASTM Designation A532-75 Class III, Type A, and be a minimum of 700 Brinell hardness for maximum war resistance.
- H. The pump manufacturer shall provide a means to remove and reinstall the pump into the wet pit without entering the pit or disconnecting piping using a cast, base elbow, constructed of Hi-chrome iron ASTM A532, with a minimum Brinell hardness of 650 and wall thickness of 3/4", which shall be permanently mounted in the grit separator as shown by the plans. The fast-out/base-elbow casting shall include a base elbow to which vertical discharge piping can be connected and provide mounts for two stainless steel Schedule 40 rails which will guide the pump into position.
- I. The pump motor shall be suitable for completely submerged service rated 15 HP, 3 phase, 60 cycle, 460-volt, 1200 RPM, and shall be mounted on the pump with the impeller attached to the motor shaft by suitable means. The motor shall be squirrel-cage induction premium quality suited for sewage wet well applications defined by the National Electric Code as Class 1; Division 1, hazardous locations section 501-8(a) requiring explosion proof construction. The motor shall

conform to the latest applicable requirements of NEMA, IEEE, ANSI and NEC standards. The motors shall be furnished with Class F rated insulation materials and shall be rated as Class F, 1.15 service factor, Class 1, Groups C&D. The motor shall be manufactured in the United States of America. The ability to provide any/all replacement parts, engineering design support, complete dynamometer testing, and U/L rerate capability shall be provided domestically.

- J. The motor bearings shall be ball, single row, deep groove, Conrad type, and shall have a Class 2 internal fit conforming to AFBMA Std. 20 with a minimum L10 rating life of 17,500 hours. The motor shall be greased by the manufacturer with premium moisture resistant polyurea thickened grease containing rust inhibitors and suitable for operation over a temperature range of 25° C to +120° C.
- K. Two independently mounted mechanical face type shaft seals shall be provided. The inner and outer seals shall be separated by an oil filled chamber. The oil chamber shall act as a barrier to trap moisture and provide sufficient time for a planned shutdown. The oil shall also provide lubrication to the internal seal. Standard John Crane Type 21, Sealol type 43, or Sealol type 42, U/L approved seals shall be provided. The inner seal shall be provided with carbon rotating face and ceramic stationary face. The outer seal shall be provided with a solid tungsten carbide rotating face and a silicon carbide or tungsten carbide stationary face and shall be designed for easy replacement. The outer seal assembly will be designed to allow solids and particles to be thrown away from the seal face. In compliance with U/L Standards for explosion proof motors, a flame path shall be provided by a labyrinth slinger in the bottom flange in order to prevent the ignition of ambient gases. Under such conditions the seal design shall allow for pressure relief across either seal face. Dual moisture sensing probes shall be provided that extend into the oil chamber to detect the presence of moisture should the outer seal fail.
- L. The moisture protection system shall also be designed to detect water in the motor chamber and provide a warning signal prior to water levels reaching the bearing or wound stator assemblies.
- M. The power cable and cap assembly shall be designed to prevent moisture from wicking through the cable assembly even when the cable jacket has been punctured.
- N. The motor enclosure including: frame, end brackets, flange and cap assembly shall be cast iron, ASTM type A-48, Class 25 or better. The motor shaft shall be 416 stainless steel. 303, 304, 410 stainless steel 1704 PH, Carpenter 20, all types of Monel or Nitronic 50 stainless steel may be specified as options. All external hardware including the motor nameplate shall be made of stainless steel. Motor rotor construction shall be die cast aluminum or fabricated copper or their respective alloys. All exposed motor parts including frame, brackets, flange, and cap assembly shall receive an alkyd primer and epoxy ester finish coat of high-grade paint to resist rust and corrosion.
- O. The motor shall successfully operate under power supply variations per NEMA MG1-14.30 and shall be designed to limit the maximum surface temperature to NEC specifications for Division 1: Class 1, Group D, or Class 1, Group C&D for hazardous locations. The motor shall be NEMA Design B or A with torque and starting current in accordance with NEMA MG1-12.
- P. All motors to include 2 normally closed automatic reset thermostats connected in series and embedded in adjoining phases as required by Underwriters Laboratories for motors of 1 HP or higher.

2.3 GRIT CLASSIFIER

A. Design Data

1. Number of Units: 1
2. Design Flow Rate: 400 gpm
3. Maximum Grit Load (at +/- 2 rpm): 0.93 cu. yard./hr
4. Performance: 95% removal of all grit (specific gravity of 2.65)
5. Tank Capacity Volume: 355 gal
6. Clarifier Surface Area: 43 Sq. Ft.
7. Spiral Diameter: 12"
8. Maximum Spiral Speed: +/- 2 rpm
9. Inlet Connection: 8" Flanged Pipe
10. Overflow Connection: 10" Flanged Pipe
11. Motor: 2.0 hp
12. Body Material: 304SS with PE Liner
13. Spiral Material: Carbon steel.

B. Operation

1. The Grit Classifier shall be designed to capture and dewater concentrated grit slurry from the Grit Separator.
2. Units requiring cyclone separators as the first stage primary separation shall not be acceptable

C. Construction

1. The Grit Classifier shall include but not be limited to the following:
 - a. Specially designed tank with internal flow redirecting inlet baffle
 - b. Conveying screw
 - c. Tank covers
 - d. Tank support assemblies
2. The receiving tank and screw trough shall be constructed of stainless steel and shall be supplied with a replaceable polyurethane wear liner. The inclined screw conveyor discharge trough shall be furnished with a 304 stainless steel support assembly for the discharge end of the unit. The trough support assembly shall be shipped as one finished assembly for ease of field installation. An external trough support assembly at the lower end shall be specifically designed to support the lower end of the tank assembly.
3. The conveying screw shall be shaft-less, a minimum 3/4 inch thick, 1/2 pitch, and inclined at 25 degrees from the horizontal and require no intermediate or lower bearings.
4. Units containing lower bearing assemblies for the screw auger shall not be acceptable.
5. Units utilizing shafted screws and/or intermediate hanger bearings internal to the unit shall not be acceptable.
6. The receiving tank and screw discharge trough assembly shall be fully covered. All covers shall be stainless steel of a minimum 11 gauge thickness. All covers shall be of bolted construction with gasketing. The inlet pipe support cover shall include a welded inlet pipe with spinning flange connection. All assembly hardware shall be stainless steel.
7. All flanges shall be a minimum of 1/2 inch thick, drilled to match ANSI 150 lb. pipe flanges.

D. Drive Unit

1. The discharge trough mounted screw conveyor drive assembly shall be an integral unit with a maximum output speed of approximately 5 RPM.
2. The motor shall be 3 phase, 460 VAC, 60 Hz
3. The gear reducer shall have an oil tight housing and be bolted directly to the screw trough.

E. Valves and Accessories

1. The Grit Classifier unit shall be supplied with one (1) 2" brass ball valve to open/close the drain pipe.

F. Grit Dumpster

1. The grit dumpster shall be of adequate capacity and dimensions to be suitable for this application and shall adhere to the following specifications:
 - a. Material: Heavy duty 7 guage steel body
 - b. Casters: semi-steel, phenolic, rubber mold-on or polyurethane (two swivel and two rigid)
 - c. Drain plug shall be provided
 - d. Finish: primer and finish coat of high-grade paint to resist rust and corrosion.

2.4 CONTROLS AND INSTRUMENTATION

A. Control Panel

1. One (1) control panel shall be furnished, completely pre-wired and tested .
2. The control panel shall adhere to the following specifications:
 - a. Enclosure rating: NEMA4X
 - b. Material: 304SS
 - c. Voltage: 480 Volt
 - d. Phase: 3 Phase
 - e. Frequency: 60 Hz
 - f. Load: 21 Amp
 - g. Logic: Relay
3. The Control panel shall contain all timers, starters, switches, indicator lights, and other components necessary to operate the following equipment:
 - a. One (1) Grit Separator
 - b. One (1) Grit Pump
 - c. One (1) Grit Classifier
4. The control panel shall be supplied with a Transformer with 480 volt primary winding and 120 volt secondary winding with fused secondary.
5. The control panel shall be supplied with applicable control relays and time delay relays with a minimum one extra normally closed and one extra normally opened contact is provided for each relay.

6. Where remote monitoring is required, the panel shall be provided with all dry contacts necessary.
7. The panel door layout shall include the following items:
 - a. Front panel mounted combination main disconnect switch and circuit breaker
 - b. Back lit Power Maintained 2-way switch
 - c. System three position HOA switch
 - d. System Emergency Stop push button
 - e. System Alarm Reset push button
 - f. Grit Removal Cycle Start push button
 - g. Grit Separator fluidizing water solenoid Open/Close switch
 - h. Grit Separator fluidizing water valve OPEN indicating light
 - i. Grit Pump running light
 - j. Grit Pump three position HOA switch
 - k. Grit Pump fail indicating light
 - l. Grit Pump manual START push button
 - m. Grit Pump manual STOP push button
 - n. Grit Classifier running light
 - o. Grit Classifier fail indicating light
 - p. Grit Classifier three position HOA switch
 - q. Grit Classifier manual START push button
 - r. Grit Classifier manual STOP push button

2.5 SEQUENCE OF OPERATION

- A. The system shall be controlled to provide automatic or manual operation, manual starting and stopping and system shut down when a fault is detected.
- B. Grit Separator
 1. Screened raw wastewater shall be gravity fed into the Grit Separator continuously.
 2. A time clock (TC) shall initiate when grit discharge cycles occur. The time clock shall be adjustable to initiate cycles up to every 20 minutes.
 3. When the time clock initiates a cycle, the Grit Classifier shall operate for an adjustable time period.
 4. Concurrently, the control panel shall send a signal to open the solenoid valve
 5. located on the fluidizing line for an adjustable time period (typically 60 seconds).
 6. After the fluidizing time runs out and the solenoid valve closes, the grit pump shall operate for an adjustable period of time.

2.6 UTILITY REQUIREMENTS

- A. WATER
 1. The Grit Separator shall require an intermittent supply of minimum 50 gpm clarified non-potable water at 50 psig supplied to the grit fluidizing pipe via a NPT connection.
- B. ELECTRICAL

1. The system shall require one (1) 480 VAC, three phase electrical service connection

2.7 MATERIALS AND FINISHES

A. MATERIALS

1. All stainless steel used for the fabrication of the equipment shall conform to the following standards:
 - a. Plate and Sheet: ASTM A167/A240
 - b. Bar: ASTM A276/A479
 - c. Tube: ASTM A312

B. EXTERIOR SURFACES FINISHES

1. All surfaces shall be free of sharp edges, weld spatter and residue. All welds shall be ground smooth.
2. All stainless steel surfaces shall be acid washed.

2.8 MANUFACTURER

- A. The Grit Removal System shall be manufactured by Hydro International, Hillsboro, OR approved equal. Being named or bidding as an approved equal does not relieve the manufacturer of meeting these specifications.
- B. Alternate manufacturers shall require the engineer's written approval during the bidding period in accordance with bidding requirements.

PART 3 - EXECUTION

3.1 DELIVERY AND INSTALLATION

- A. The equipment and material shall be shipped complete except where partial disassembly is required by transportation regulations or for protection of components.
- B. Spare parts shall be packed in containers bearing packing lists clearly designating contents and pieces of equipment for which they are intended.
- C. The CONTRACTOR shall inspect equipment prior to unloading and notify the MANUFACTURER of any damage to equipment to effect proper remedial action. Failure to notify the MANUFACTURER of damage to equipment prior to unloading shall void all warranties pertaining to subject equipment.
- D. The CONTRACTOR shall unload, store and safeguard equipment, materials, and spare parts in accordance with MANUFACTURER'S recommendations.

3.2 EXAMINATION

- A. Coordinate the work of this section with the work of other sections.
- B. Verify that site conditions are ready to receive the work of this section.
- C. Verify that required utilities are available and in correct locations.
- D. Verify dimensions and clearances in the field prior to installation to ensure proper fitting and operation of equipment.

3.3 INSTALLATION

- A. Contractor shall perform all field wiring and other utility connections as required by manufacturer to provide a complete working system.
- B. Install all equipment and components in accordance with Drawings, manufacturer's instructions and Sections 01400, 01600 and 01610.
- C. Furnish all accessories and components as required to provide a complete working system in accordance with manufacturer's recommendations.
- D. Prior to startup, the manufacturer shall provide assistance and inspection of installed equipment for proper alignment, operation and connections as described in Sections 01400, 01600 and 01610.
- E. Manufacturer's representative shall make all final adjustments for proper operation in accordance with Sections 01600 and 01610.

3.4 DEMONSTRATION

- A. Satisfactory operation shall be demonstrated in accordance with Section 01610.

3.5 MANUFACTURER'S CERTIFICATE(S)

- A. Provide MANUFACTURER'S certificate of installation and commissioning following functional testing and startup in accordance with Section 01700.

3.6 START-UP, TRAINING AND MANUFACTURER'S SERVICES

- A. A factory trained representative for the equipment specified herein shall be present at the jobsite and/or classroom designated by the Owner for a maximum of four (4) 8-hour man-days (two (2) visits) for installation inspection, plant startup, functional testing, and operator instructions; travel time excluded in accordance with Section 01610.

END OF SECTION

DIVISION 14
CONVEYING EQUIPMENT

SECTION 14600
HOISTS AND CRANES

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. WORK INCLUDED

- 1. Furnish and install two electric chain hoist/trolley assembly mounted on an I beam with accessories as shown on the Drawings and described in this specification.

1.3 SUBMITTALS

- A. Submit Product Data, Shop Drawings and installation instructions under the provisions of Section 01300.

1.4 OPERATION AND MAINTENANCE DATA

- A. Submit under provisions of Sections 01300 and 01700.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, protect and handle equipment according to the provisions of Sections 01600 and 01610.

1.6 QUALITY ASSURANCE

- A. The appurtenances for equipment provided under this specification shall be from the same equipment manufacturer in order to achieve standardization of operation, maintenance, spare parts, manufacturer's service and warranty.

1.7 WARRANTY

- A. Provide a one year warranty which begins when the equipment is accepted by the Owner in accordance with Sections 01700 and 01740.

1.8 MANUFACTURER'S REPRESENTATIVE

- A. Furnish the services of a qualified equipment manufacturer's representative in accordance with Sections 01400, 01600 and 01610 if required during installation or start-up.

PART 2 - PRODUCTS

2.1 TROLLEY HOIST FOR GRIT PUMP

- A. Provide a one ton US Army type trolley hoist with lug suspension and hand geared trolley with 8 foot lift. Trolley hoist shall be integrally built trolley and chain block combination.
- B. The hoist frame shall be impact resistant, lightweight, heat treated, permanent mold cast aluminum alloy. The frame shall be heavily proportioned, designed for rigidity to hold the gears and bearings in close alignment. The frame and covers shall enclose all operating parts protecting them from dirt and weather.
- C. The chain wheel shall be formed to receive the links of the hand chain, and an overload device calibrated for the capacity of the hoist.
- D. The gearing shall be a straight spur for good efficiency, with gears and pinions generously proportioned and precision cut from alloy steel and heat treated for maximum strength and durability. Gears shall be grease packed in a grease tight gear case.
- E. An automatic, screw actuated, Weston-type load brake shall hold the load under all conditions and permit fine smooth control in lowering. The brake shall be self-adjusting with long wearing friction washers.
- F. The load sprocket and sprocket gear shall be machined from a one-piece steel forging. The chain guide shall be heat-treated, spring steel, flexible guide which provides heat treated smooth surfaces that flex in the frame, controlling the load without binding.
- G. The load chain shall be formed from closely calibrated chain links of heat treated steel alloy. The links shall be accurately formed to fit the pockets of the load sprocket. Sufficient length of chain shall be provided to allow hoisted equipment to be lowered to finished grade level.
- H. The hand chain shall be zinc plated welded steel links accurately formed to fit the pockets of the chain wheel for gag-resistant operation in the chain wheel and guide arrangement.
- I. The hooks shall be drop forged steel which will open noticeably when subjected to excessive overload. They shall be full swiveling and equipped with a spring type hook latch.
- J. Provide a hand geared one ton rigid mount trolley linked to the hoist via a lug suspension.
- K. Trolley shall have geared wheel flanges on one side that mesh with a pinion.
- L. The wheels shall be steel with hardened treads and ball bearings which operate on flat I beam flanges of the size shown on the Drawings.

- M. Movement of hand geared trolley shall be accomplished by pulling on an endless hand chain. Trolley wheel gears and pinions shall have machine cut gear teeth.
- N. Trolley hoist shall be Budgit Model 8322 by Columbus McKinnon Corporation or approved equal.

2.2 CHAIN CONTAINER

- A. Provide a chain container to accommodate the length of chain supplied with the hoist.
- B. Chain container shall be Budgit Model 902631 by Columbus McKinnon Corporation or approved equal.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install specified equipment in accordance with manufacturers instructions, Drawings, and Section 01600 and 01610.
- B. Coordinate placement of hoist and trolley with installation of beams and equipment to be lifted.
- C. Installation shall include furnishing and applying initial supply of grease and oil if recommended by manufacturer.
- D. Check and align equipment to ensure smooth, accurate operation.

3.2 TESTING

- A. After installation is complete, start-up, test and demonstrate equipment in accordance with Sections 01400, 01600 and 01610.
- B. Provide instruction to Owner in accordance with Section 01600 and 01610.

END OF SECTION

DIVISION 15
MECHANICAL

SECTION 15000
PIPING AND VALVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes

1. Furnish and install piping, valving, and miscellaneous appurtenances as indicated on the Drawings and specified herein.

B. Related Sections

1. Division 15 Section 15140 – “Supports and Anchors”

1.3 REFERENCES

A. American National Standards Institute/American Water Works Association

1. ANSI/AWWA C104/A21.4 - Cement - Mortar Lining for Ductile Iron Pipe and Fittings for Water.
2. ANSI/AWWA C110/A21.10 - Ductile Iron and Gray Iron Fittings.
3. ANSI/AWWA C111/A21.11 - Rubber Gasket Joints for Ductile Iron Pressure Pipe and Fittings.
4. ANSI/AWWA 15/A21.15 - Flanged Ductile Iron Pipe with Ductile Iron or Gray Iron Threaded Flanges.
5. ANSI/AWWA C150/A21.50 - Thickness Design of Ductile Iron Pipe.
6. ANSI/AWWA C151/A21.51 - Ductile Iron Pipe Centrifugally Cast for Water.
7. ANSI/AWWA C153/A21.10-87 - Ductile Iron Compact Fittings, 3 in. through 16 in. for Water Service.
8. ANSI/AWWA C561 — Fabricated Stainless Steel Slide Gates
9. ANSI/AWWA C600 - Installation of Ductile Iron Water Mains and their Appurtenances.

B. ASTM International (American Society for Testing and Materials)

1. ASTM A53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated, Welded and Seamless.
2. ASTM A1248 - HDPE Pipe.
3. ASTM DI 784 - Standard Specification for Rigid Poly (Vinyl Chloride) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) compounds.

4. ASTM DI 785 - Specifications for Poly (Vinyl Chloride)(PVC) Plastic Pipe, Schedules 40, 80, and 120.
5. ASTM D2241 - Standard Specification for Polyvinyl Chloride (PVC) Pressure Rated Pipe (SDR Series)
6. ASTM D2321 Standard Specification for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity - Flow Applications.
7. ASTM D2467 - Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings Schedule 80.
8. ASTM D2564 - Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems.
9. ASTM D2855 - Making Solvent - Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings.
10. ASTM D2774 - Standard Practice for Underground Installation of Thermoplastic Pressure Piping.
11. ASTM D3034 - Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
12. ASTM D3139 - Standard Specification for Joints for Plastic Pressure Pipe Using Flexible Elastomeric Seals.
13. ASTM D3212 - Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.
14. ASTM F477 - Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
15. ASTM A312, A409 for SS pipe and tubing.
16. ASTM A403, A182 and A296 for SS fittings, forgings and casting.
17. ASTM A-193 for bolting materials.

C. American Water Works Association

1. AWWA C-900, PVC Pressure Pipe & Fabricated Fittings, 4 inch through 12 inch.
2. AWWA C-905, PVC Pressure Pipe & Fabricated Fittings, 14 inch through 48 inch.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Submit manufacturer's technical Product Data, installation instructions, and directions for adjustment for all Products required to complete Work of this Section.
- C. Submit Shop Drawings: Indicate pipe materials and fittings used, valves, joining methods, all equipment of this Section, installation and piping connections for all piping systems to be installed under this section.

1.5 OPERATION AND MAINTENANCE DATA

- A. Submit under provisions of Sections 01300 and 01700.
- B. Maintenance Instructions: Include maintenance instructions and procedures, and spare parts lists.

1.6 QUALITY ASSURANCE

- A. Valves: To bear AWWA or UL label or marking. Provide manufacturer's name and pressure rating marked on valve body.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, protect and handle Products to site under provisions of Sections 01600 and 01610.
- B. Deliver and store valves in shipping containers, with labeling in place.
- C. Provide temporary protective coating on valves.
- D. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

PART 2 - PRODUCTS

2.1 DUCTILE IRON PIPE (DIP)

- A. Ductile iron pipe shall conform to AWWA C150 and AWWA C151 and shall have an ANSI Class 52 thickness unless otherwise specified.
- B. All buried pipe shall receive an outside bituminous seal coat and cement interior lining in accordance with AWWA C104. Above ground or exposed piping shall be uncoated and suitable for painting.
- C. Above ground or exposed ductile iron pipe shall be flanged in accordance with ANSI A21.15. Buried ductile iron pipe shall have push-on joints, mechanical joints, or flexible joints where indicated on the Contract Drawings. Rubber gaskets shall conform to ANSI A21.11 for mechanical and push-on joints. All buried joints shall be restrained type similar to Mega-lug series 1100 manufactured by EBAA Iron or equal. Concrete restraint is also required as shown on the drawings.
- D. Ductile iron fittings shall conform with AWWA C110 or C153.
- E. All gaskets between flanged connections and fittings shall be non-asbestos composition minimum thickness of 1/8" and shall be coated with thread lubricant prior to making up joints. Flange bolts, nuts and washers shall be of mild steel with sound, well-fitted threads, the nuts shall be cold-punched, hexagonal, trimmed, and chamfered. Heads, nuts and threads shall be United States standard sizes. Bolts shall be of such length as to project one-quarter inch beyond the nut when the flanged joint with gasket is assembled.
- F. Ductile iron pipe shall be manufactured by U.S. Pipe and Foundry Company, Inc., American Cast Iron Pipe Company, or approved equal.

2.2 STAINLESS STEEL PIPE

- A. Stainless steel pipe carrying liquids shall be Schedule 10 or Schedule 40 as shown on the drawings. All pipe shown as "SS" less than 4" in diameter shall be 304L Schedule 40 with screwed fittings. All pipe and fittings shown as "SS" 4" and greater shall be 304L Schedule 10 150 lb. rated with flanged connections (Vanstone or equal) or welded.
- B. Stainless steel air pipe above grade shall be Schedule 5 and be joined by welding.
- C. Pipe and fittings shall meet the requirements of ASTM312 and A403 respectively, seamless, Grade TP304L, with dimensions conforming to ASME B36.19M. Stainless steel tubing joints shall be shop welded full penetration butt joints or Van Stone joints using angle face rings with backing flanges drilled in accordance with ASME B16.5, Class 150.

2.3 PVC GRAVITY PIPE

- A. PVC compound shall conform to ASTM D 1784.
- B. PVC pipe eight inches and larger shall conform to ASTM D3034, SDR 35, Type PSM, with integral bells meeting requirements of ASTM D3212. Rubber gaskets shall conform to ASTM F477.
- C. Fittings for PVC pipe eight inches and larger shall conform to ASTM D3034, SDR 35, Type PSM. Joints shall meet requirements of ASTM D3212 and gaskets shall conform to ASTM F477.
- D. Pipe and fittings shall be manufactured by CertainTeed Corporation; J-M Manufacturing Company, Inc., or equal.

2.4 PVC PRESSURE PIPE

- A. Pipe and Fittings Less Than 4 inch Diameter
 - 1. Pipe shall meet requirements of ASTM DI 785, Schedule 40, Schedule 80, or SDR 21 where indicated. All SDR 21 pipe and fittings shall be bell and spigot type.
 - 2. Pipe shall be manufactured of Type I, Grade I PVC materials conforming to ASTM DI 784, minimum cell classification 12454; PVC pressure pipe for plumbing systems, if required, is specified in other sections.
 - 3. Schedule 40 or Schedule 80 piping systems shall be joined by socket-weld connections except where connecting to unions, valves, and equipment with threaded connections that may require future disassembly. Connections at those points shall be threaded and back-welded.
 - 4. The schedule rating for the fittings shall not be less than that for the associated pipe. Fittings shall be ASTM DI 784, minimum cell classification 12454, PVC conforming to the requirements of ASTM D2467, socket type.
 - 5. PVC Solvent Cement: Socket connections shall be joined with PVC solvent cement conforming to ASTM D2564. Manufacture and viscosity shall be as recommended by the pipe and fitting manufacturer to assure compatibility. Joints shall be prepared with primers conforming to ASTM F656 prior to cementing and assembly.
- B. Pipe and Fittings 4 inch Diameter to 24 inch

1. Pipe shall conform to AWWA C900 or C905 and shall be plain end or gasket bell end, Pressure Class 150 (DR 18), with cast-iron-pipe-equivalent OD.
 2. Joints for pipe shall be push-on joints as specified in ASTM D3139.
 3. Joints between pipe and fittings shall be compression-type joints/mechanical-joints as respectively specified in ASTM D3139 and AWWAC111/A21.11.
 4. Each joint connection shall be provided with an elastomeric gasket suitable for the bell or coupling with which it is to be used. Gaskets for push-on joints for pipe shall conform to ASTM F477. Gaskets for compression-type joints/mechanical-joints for joint connections between pipe and fittings shall be as specified in AWWA CI 11/A21.11. All buried joints shall be restrained with Mega-Lug or equal. Concrete restraint is also required as shown on the drawings.
 5. Fittings shall be ductile iron conforming to AWWA C110/A21.10 or AWWA C153/A21.53. Fittings shall have pressure rating at least equivalent to that of the pipe. Fittings shall have mechanical joint connections. Fittings shall have an epoxy coating on the interior and exterior surfaces in accordance with AWWA CI 16/A21.16 or cement-mortar lining in accordance with AWWA C104/A21.4, standard thickness. Buried fittings not having an epoxy coating shall receive a bituminous seal coat on the exterior surfaces in accordance with AWWA CI 51/A21.51.
 6. Pipe and fittings shall be manufactured by CertainTeed Corporation, J.M. Manufacturing Company, Inc., or equal.
- C. Push-on buried joints shall be restrained with Bell Restraint Series 2800 (for C905 pipes) and Series 1500 (for C900 pipes) manufactured by EBAA Iron or equal. Concrete restraint is also required as shown on the drawings. Mechanical joints shall be restrained with Mega-Lug Series 2000PV by EBAA Iron or equal.

2.5 GATE VALVES - RESILIENT WEDGE

A. Valves 12" or smaller

1. Gate valves shall be furnished and installed where indicated on the Drawings. Each gate valve shall conform to AWWA Standard C509 or C515 for resilient wedge gate valves. The cast iron gate valves shall be epoxy coated inside and out. The valve stem shall be constructed of manganese bronze and shall be equipped with a wedge nut to provide low operating torque. Stem sealing shall be accomplished by dual O-rings allowing replacement of O-rings seals while the valve is open and under pressure. Buried valves shall be equipped with an extension stem. Valves shall be Mueller, Clow Corporation, M&H Valve, A.P. Smith Company, American R/D, Kennedy, or equal.

B. Valves 14" or Larger

1. Gate valves shall be furnished and installed where indicated on the Drawings. Each gate valve shall conform to AWWA Standard C500, as applicable to double discs, and handwheels shall be cast iron. Valve bodies used with PVC pipe shall be PVC pipe end connections or mechanical joint connections with PVC adapters. Where flanged piping is called for, valve bodies shall be furnished with ASA B 16.1 125E flange ends. Accurately machined bronze seating rings shall be secured in the valve bodies. Valves shall be provided with bronze seatings rings, machined and scraped, if necessary, to seat truly flat against body sating rings. All gate valves shall be supplied with non-rising stems unless

otherwise noted as the Drawings. Valve stems shall rotate freely in the valve bonnet recess and shall close by and clockwise rotation. Where rising stems are specified, the stem collars shall be designed to seat tightly against the bonnet bushing with the valve in the open position, permitting repacking of the stuffing box under line pressure. Stuffing box glands shall be bronze: gland followers shall be cast iron. Buried valves shall be equipped with an extension stem. Gate valves shall be as manufactured by Clow Corporation, M&H Valve Fitting Company, A.P. Smith Company, American R/D, Kennedy Valve or equal.

2.6 VALVE BOXES

- A. All buried gate valves shall be furnished with a suitable cast iron valve box. Valve boxes shall be two or three piece, screw or slide type installed over the bonnet and operating nut of the valve and be of sufficient length to reach the surface of the ground but not to extend above the ground surface. Valve box covers shall be marked "sewage". Valve box shall be as manufactured by Tyler Pipe or approved equal.
- B. Installation shall be such that when setting a valve box in place, the base should rest two or more inches above the flanged joint of the cover. The top of the operating nut should be no higher than the hub or upper part of the valve box base where it connects to the center section. This location for the valve box will leave ample space all around the valve, prevent the box from touching the valve in any way, and permit free access to the operating nut with a valve wrench or operating stem.
- C. Provide "valve box aligner" to keep box centered over operating nut, USA Blue Book #75181.

2.7 VALVE KEY

- A. The Contractor shall furnish two 4 foot long valve operating wrenches, Mueller A24610, or approved equal if buried valves are utilized in the project.

2.8 AIR RELEASE VALVES

- A. Air release valves used to vent pressure lines shall be short body valve, size 2" NPT inlet and 3/16" orifice.
- B. Body and cover shall be ASTM A 126 Class B Cast Iron. The internal parts shall be stainless steel.
- C. Air release valves shall be model 34-WWS manufactured by Cla-Val Co or approved equal.

2.9 WALL SLEEVES AND WALL PIPES

- A. All pipe passing through water retaining walls, floors or other structural members shall utilize wall pipes unless otherwise stated on the drawing.
- B. Wall pipes shall be mechanical joint type ductile iron with intermediate waterstop flange as manufactured by Clow Corporation Model F- 1429.

- C. Ductile iron wall pipes shall be flush to the wall as indicated on the drawing. MJ flange side of the wall pipe shall be tapped for studs.

2.10 SLUICE GATE

- A. Sluice gates shall be open frame, wall mounted with embedded bottom frame, furnished and installed complete with operating stem, gate lift operator and other appurtenances as specified or needed to make a complete and operable installation. All components subject to submergence shall be constructed of stainless steel.
- B. Gates shall be heavy duty and meet requirements of AWWA Specifications C-561 (latest version). All mating and sliding parts shall be fully machined. The sluice gates shall be shop tested for leakage and proper operation before shipping.
- C. Sluice gates shall be substantially watertight under the design head conditions. Leakage shall not exceed 0.05 U.S. gallon per minute per foot of seating perimeter. Testing shall show minimum deterioration after 25,000 cycles of operation. Gates shall be sized to cover open area and wall thickness of pipe it is to seal.
- D. The frame shall be made of wrought stainless steel of the specified commercial grade or from commercially available structural shapes. The minimum material thickness of all members except seal retainers shall be $\frac{1}{4}$ - inch. (6.4 mm). The gate frame shall be constructed of structural members or formed plate welded to form a rigid one-piece frame with a flanged back design. The frame shall be of the flange back design suitable for mounting on a concrete wall. The guide slot shall be made of UHMWPE (ultra high molecular weight polyethylene). A rigid stainless steel invert member shall be provided across the bottom of the opening. The invert member shall be of the flush bottom type. A rigid stainless steel top seal member shall be provided across the top of the opening.
- E. The slide and reinforcing stiffeners shall be constructed of stainless steel plate. All structural components shall have a minimum thickness of $\frac{1}{4}$ -inch (6.4 mm). The slide shall be designed for the minimum safety factor of 4 with regard to ultimate tensile, compressive, and shear strength, and a minimum safety factor of 2 with regard to the tensile, compressive, and shear yield strength. The slide shall consist of a flat plate reinforced with formed plates or structural members to limit its deflection to $\frac{1}{720}$ of the gate's span under the design head.
- F. Self-adjusting seal systems utilizing UHMWPE seals and resilient compression cord shall restrict leakage to that specified herein. The self-adjusting seals shall be designed with a continuous compression cord to ensure contact between the UHMWPE guide and the gate in all positions. The sealing system shall maintain efficient sealing in any position of the slide and allow the water to flow only in the opened part of the gate. The guides shall be made of virgin UHMWPE (ultra high molecular weight polyethylene) to restrict leakage, prevent metal-to-metal contact between the frame and the slide, and provide long-term maintenance free operation. The guides/seals shall extend to accommodate minimum $1\frac{2}{3}$ x the height of the slide. The top seal shall be the self-adjusting type, utilizing a cup shaped UHMWPE seal with twin contact surfaces and compression cord. The cup shaped seal with twin contact surfaces shall be designed with the outer seal acting as a wiper to remove debris from the slide when raising the gate thereby protecting the primary seal. A resilient seal made of neoprene shall be set into the bottom frame member to seal the bottom portion of the gate and form a flushbottom. All UHMWPE seals must be bolted or

otherwise mechanically fastened to the frame. Gates that utilize rubber "J" seals or "P" seals are not acceptable.

- G. The operating stem shall be constructed of stainless steel of the specified grade designed to transmit in compression at least 2 times the rated output of the operating manual mechanism with a 40 lbs. (178 N) effort on the crank or handwheel. The stem shall have a slenderness ratio (L/r) less than 200. The threaded portion of the stem shall have machined cut threads. The couplings shall be grooved and keyed and shall be of greater strength than the stem.
- H. Stem guides shall be furnished when necessary to ensure that the L/r ratio shall not be greater than 200. Stem guides shall be fabricated from type 304L (or 316L) stainless steel. The guide shall be equipped with an UHMWPE bushing. Stem guides shall be mounted on stainless steel brackets and attached to the wall by stainless steel anchor bolts provided by the manufacturer. Brackets shall be sufficient strength to prevent twisting or sagging under load. Guides shall be adjustable in two directions and spaced in accordance with the manufacturer's recommendation.
- I. Rising stem gates shall be provided with a clear PVC stem cover. The stem cover shall have a cap and condensation vents and a clear mylar position indicating tape. The tape shall be field applied to the stem cover after the gate has been installed and positioned.
- J. Sluice gates shall be manually operated by handwheel operated pedestal floor stand. The manual actuator shall have a direct-drive handwheel without reduction gearing. The actuator shall be sized to permit slide operation with an effort of not more than 40-1b (178-N) pull on the handwheel—handcrank. Maximum pull or torque to start the slide in motion must not exceed one and one-half times this amount. Components of the actuator shall be designed to withstand these input efforts or torques with a minimum safety factor of 5 with regard to ultimate tensile, compressive, and shear strength.
- K. The manual actuator shall have a bronze lift nut threaded to fit the operating stem. Lift nuts shall be of high strength bronze having a minimum tensile of 65 ksi, and a minimum hardness of 94 BHN. Threads shall be Acme type and shall have a PV (pressure velocity) factor not exceeding 50,000 (pressure velocity factor is surface feet per minute times contact pressure in PSI [SFPM x PSI]) for open/close service and 30,000 for modulating service with lubrication as specified by the manufacturer. Maximum pressure on the projected area of thread contact shall not exceed 2,000 psi at normal maximum operating load. Roller, needle or ball bearings shall be provided above and below the flange on the lift nut to take the thrust developed during gate operation. Bearings shall be enclosed in a cast iron, ductile iron, or cast aluminum housing with oil seals and O-rings used to seal the unit. Fittings shall be provided so that bearings can be periodically lubricated. The actuator shall be supplied with a pedestal, torque tube, or baseplate, machined and drilled for mounting the lift housing.
- L. The crank shall be removable and fitted with a corrosion-resistant rotating handle. The maximum handwheel diameter shall be 30 inches and the handwheel shall be approximately 36 inches from the operating floor unless otherwise shown. The direction of wheel or crank rotation to open the gate shall be indicated on the actuator.
- M. Sluice gates and equipment shall be stored and installed in accordance with the installation manual furnished by the gate manufacturer. After installation, the completely assembled gate, stem, guides and lift shall be operated through one full cycle to demonstrate satisfactory operation. Such adjustments as necessary will be made until operation is approved by the Engineer.

- N. Sluice gates shall be Series 20 stainless steel flow control gates as manufactured by Fontaine Industries LTD or approved equal.

2.11 DRESSER COUPLINGS

- A. Where indicated on the Drawings, Contractor shall supply Dresser type couplings. Dresser couplings shall consist of one cylindrical steel middle ring, two steel follower rings, two resilient gaskets and a set of steel track head bolts. The couplings shall provide a flexible, leak-proof seal. Couplings shall be manufactured for joining two plain-end pipes of sizes shown on the Drawings. Glands and gaskets of appropriate type to fit pipe O.D. shall be supplied. Couplings shall be Style 38, 62, 138, 153, or 162 as appropriate by Dresser Industries, Inc., equivalent coupling by Smith Blair, Clow, or approved equal.

2.12 CHECK VALVES

- A. Check valves shall be furnished and installed where indicated on the Drawings. Each valve shall conform to AWWA C508. Each check valve shall be of the iron body, bronze-mounted swing type. Valve body, bonnet and disc shall be ASTM A1 26 cast iron. Body shall be furnished with ASA B16.1 125E flanges. Bonnet shall be sufficiently large to permit cleaning and maintenance of inner works without removing the valve body from the line. Disc and valve body shall be provided with machine-face bronze seating rings. Valve disc shall be securely bolted to malleable iron hinges; hinges shall be secured to bronze hinge pins, supported by bronze bearings mounted in the valve body. Hinge pins shall extend through the valve bearings mounted in the valve body. Hinge pins extend through the valve body and shall be suitable for attachment of outside weight and lever assembly. They shall be as manufactured by Wheatly-Dresser, Zy-Tech Fairbanks, Clow, GA Industries, Apco Industries, or approved equal.

2.13 COPPER PIPE

- A. Above ground copper pipe shall be Type L conforming to ASTM B88-96 and ASTM B-280.
- B. Underground copper pipe shall be Type K conforming to ASTM B88-96 and ASTM B-280.
- C. Copper fittings shall be wrought copper, ASME B1 6.22, compressive type.
- D. Joints: Tubing shall be joined using solder fittings except where connections to unions, valves, and equipment with threaded connects that may require future disassembly. Solder joint fittings shall conform to ASME B 16.22 and ASME B16.18. Dielectric fittings or isolation joints shall be provided between all dissimilar metals; as manufactured by EPCO or equal.
- E. Solder Joint Material: Alloy Grade 95-5 (95% tin — 5% silver) in wire or rod conforming to ASTM B32 with flux as recommended by manufacturer applied to fitting and pipe.

2.14 UNDERGROUND WARNING TAPE

- A. Contractor shall provide and install underground detectable warning tapes for all underground pipeline installations. Tape shall be polyethylene plastic, acid-and alkali-resistant, manufactured

specifically for warning and identification of buried utility lines. Tape shall be metallic core or metallic-faced enabling detection by a metal detector when tape is buried up to 3 feet deep. Tape shall be manufactured by Seton Nameplate Corporation or equal.

2.15 BRONZE BALL VALVES

- A. Provide bronze ball valves of the size indicated on the Drawings. Ball valves shall be fully ported with TFE seats and seals, and stainless steel ball, stem and handle nut. Ball valves shall be manufactured by Nibco Inc., T-595-Y-66 and T-560-BRY-66, or approved equal.

2.16 PVC BALL VALVES

- A. Provide PVC True Union Ball Valves with Viton/PTFE or ethylene propylene diene monomer (EPDM) O-ring stem seals, polyvinyl chloride (PVC) bodies, balls, and stems. Thermoplastic shall conform to ASTM DI 784, minimum cell classification 12454. Valves shall be end entry, with solvent-weld socket end connections, and ethylene propylene diene monomer (EPDM) seat. Valves shall be rated for 150 psig service at 120 degrees F and have hand lever operators.

2.17 STAINLESS STEEL BALL VALVES

- A. Provide stainless steel valves of the size indicated on the drawings. Valves shall conform to ASTM A 351/A 351M Grade CF8M stainless steel body, full port, with ASME B 16.5 flanged end connections. Valves shall have polytetrafluoroethylene (PTFE) seats, TP316 stainless steel stem, stem seal and bearing and stainless steel ball. Valves shall be rated for 200 psig service, and have hand lever operator. Manufactured by Nibco, Neles-Jamesbury or equal.

2.18 PIPE TAPS

- A. Provide taps where shown or required for small pipe or instrument connections. Where the pipe or fitting wall thickness is insufficient to provide required number of threads, a SS boss or SS tapping saddle shall be installed or pipe class shall be increased. Threads shall be protected with temporary plugs. Saddles shall be Ford SS saddles Style FS303 for C900 PVC or approved equal.

2.19 CORPORATION STOPS

- A. Corporation stops with coupling nuts and main shall be Mueller Models H-15008, H-15009 and H-15013, Ford Meter Box or approved equal.

2.20 SERVICE CLAMPS

- A. Service clamps shall be Mueller Model H-16126, H-16130 and H-16134, Ford Meter Box or approved equal.

2.21 SERVICE FITTINGS

- A. Service fittings shall be compression type, manufactured by Mueller, Ford meter Box or approved equal.

2.22 FROSTPROOF WALL HYDRANT

- A. Anti-siphon frostproof wall hydrant with 3/4" hose connection, 3/4 inch male pipe thread on inlet, and copper body tube in length suitable for wall depth. Hydrant shall consist of bronze body, nitrile seat and metal handwheel; ASSE 1019-A Compliant, CSA Approved, IAPMO Listed. A copper, brass or bronze operating rod shall be provided within a copper casing of sufficient length to extend through the wall so that the valve is inside the building, and the portion of the hydrant between the outlet and valve is self-draining. A brass or bronze valve with coupling and union elbow having metal-to-metal seat shall be provided. Valve rod and seat washer shall be removable through the face of the hydrant. NIBCO Fig, 90 or equal.

2.23 PRESSURE GAUGE

- A. Pressure gauges shall be supplied with 1/4" stainless steel ball valves with black, drawn steel cases and 4-1/2" dials. Pressure gauges shall be Model 1279 4-1/2" and 1/4" NPT as manufactured by Ashcroft or approved equal. Pressure ranges shall be selected by the Engineer.

2.24 BUTTERFLY VALVES (LIQUID)

- A. Butterfly valves shall be furnished with a 10 position lever or wheel operator as shown on the drawings. Each valve shall be of cast iron construction. Valves shall have molded EPDM rubber seats and shall be bubble tight under all pressure conditions. Valve shaft shall be 316 stainless steel. Valve operator, whether position lever or geared, shall be designed to hold the valve in any intermediate position between full open and fully closed without creeping or fluttering. Disc shall be 316 stainless steel. Valves shall meet requirements of AWWA C504.
- B. Valves shall be BRS Resilient Seated by DeZurik, Miliken, Kennedy, Val-Matic American, or equal.

2.25 PLUG VALVES

- A. Eccentric plug valves shall be furnished and installed where indicated on the drawings. Each eccentric plug valve shall conform to AWWA C504 and MSS SP108 for eccentric, non-lubricated plug valves. Buried valves shall be equipped with a two inch square operating nut. Valves shall be DeZurik, Val-Matic, or equal.
- B. All valves above ground or in vaults shall be flanged valves unless otherwise noted.
- C. All buried valves shall have mechanical joint connections. Valve bodies used with PVC pipe shall be PVC pipe end connection or mechanical joint connections with PVC adapters.

2.26 DRAINS

- A. Floor Drains (FD) shall be cast iron body and flashing collar with nickel bronze adjustable round strainer head, secured grate vandal proof top and sediment bucket. Provide with "P" trap. J.R. Smith series 2110-W Josam, Watts.
- B. Floor Area and Indirect Waste Drain shall be suitable for large volume drainage and indirect waste applications. Drain shall be 12" x 12" x 8" deep cast iron body with loose set ³/₄ grate to allow grit classifier drain pipe to discharge through opening in grate. Grate and frame shall be cast iron or stainless steel, medium or heavy duty for foot traffic. Provide an anti-splash aluminum dome strainer and 4" outlet pipe. MIFAB Model FS 1730, equivalent by J.R. Smith, or equal.

2.27 QUICK DISCONNECT COUPLING

- A. Quick Disconnect Coupling shall be hot dipped galvanized, high tensile strength, abrasion resistant steel fabricated to allow watertight connection to Godwin pump suction or discharge as manufactured by Bauer or equal. Contractor shall coordinate with Owner to select end type, size and coupling configuration to match Owner's portable pump. Assembly shall be rated for pump discharge pressure. Provide compatible corrosion resistant dust cap.

2.28 WATER HAMMER ARRESTOR

- A. Water Hammer Arrestor shall consist of a pre-charged air chamber that is rechargeable, an air-tight sealing cap, standard tire valve connection for easy charging, stainless steel top, sealed-in diaphragm and stainless-steel chamber. Maximum Working Pressure: 150 psi, Maximum Shock Pressure: 200 psi, Maximum Velocity: 10 F.P.S. Water Hammer Arrestor shall be Watts Series 150A or equal.

2.29 FLOOR BOXES

- A. Floor boxes shall be cast in precast concrete vault tops where indicated on Drawings. Floor boxes shall provide support for extension stems and provide cover for operation nut.
- B. Floor boxes shall be bushing type F-5695 by Clow Corporation or approved equal.

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

- A. Examine all pipe, fittings, valves and other appurtenances for damage or defects immediately before installation.
- B. Mark and hold for inspection by Owner any defective Products.
- C. Verify dimensions of all pipes, valves, fittings and appurtenances to ensure all Work of this Section will fit together properly and conform to Drawings.

- D. Verify lines, grades, slopes and elevations to ensure that the installed work of this section will meet the requirements shown on the Drawings.
- E. Verify that trench excavations meet alignment, depth, width and elevation requirements shown on the Drawings.
- F. Verify that trench bottoms to receive Work of this Section are smooth and free of water, frozen materials, large stones or dirt clods.
- G. Beginning of Work of this Section means acceptance of existing conditions.
- H. Pipe and equipment openings shall be closed with caps or plugs prior to installation. Equipment shall be protected from dirt, water, and chemical or mechanical damage.
- I. Repair damaged coating areas in the field with material equal to the original coating. Do not install damaged piping materials.

3.2 BELOW GRADE PIPE INSTALLATION FOR LIQUIDS

A. General Requirements

- 1. No pipework is to be started until all materials, layout, schedules, stakeout, and cut sheets have been approved by the Engineer in writing. Samples of all materials to be incorporated in the Work shall be submitted for the approval of the Engineer sufficiently in advance of Work commencement to allow time for specified testing.
- 2. Do not lay water lines in the same trench with gas lines or electric wiring.
- 3. Proper and suitable tools and equipment for the safe and convenient handling and laying of the pipe and fittings shall be used in accordance with manufacturer's standards. Pipe and fittings shall be carefully handled and lowered into the trench.
- 4. Whenever a pipe requires cutting to fit in the line or to bring it to the required location, the Work shall be done without extra compensation, in a satisfactory manner so as to leave a smooth end perpendicular to the long axis of the pipe.
- 5. Before any joints are actually made in the trench, the Contractor shall demonstrate to the Engineer, by making a sample joint, that the methods he will employ conform to specifications and will secure a watertight joint, and that the workmen whom he intends to use in this Work are familiar with the requirements of this Specification Section.
- 6. The excavation in which pipe is being laid shall be kept free from water, and no joint shall be made under water. Care shall be used to secure watertightness and to prevent damage to, or the disturbing of, the joints during the backfilling process or at any other time. After pipes have been laid and the joints have been made, there shall be no walking on or working over them except as may be necessary in tamping until there is a covering at least two (2) feet in depth over their top. After joint materials, which require it, have received their set, backfilling of the trench may proceed.
- 7. Before joints are made, each pipe shall be well bedded on a solid foundation and no pipe shall be brought into position until the proceeding length has
- 8. been thoroughly embedded and secured in place. No pipe shall be laid in wet trench conditions that preclude proper bedding, or on a frozen trench bottom, or when in the opinion of the Engineer, the trench or weather conditions are unsuitable for proper installation. Any defects due to settlement shall be corrected by the Contractor at his own

expense. Bell holes or coupling holes shall be dug sufficiently large to insure making of proper joints. In no case will pipe be closer than four (4) inches from bedrock.

9. In laying pipe, special care shall be taken to insure that each length shall abut against the next in such a manner that there shall be no shoulder or unevenness of any kind along the inside of the pipe line.
10. No wedging or blocking will be permitted in laying pipe unless by written order from the Engineer.
11. Pipes and fittings shall be thoroughly cleaned before they are laid and shall be kept clean until the acceptance of the completed Work. The open end shall be kept closed with a stopper until the next length is laid. At the close of work each day, the end of the pipe line shall be tightly closed with an expansion stopper so that no dirt or other foreign substances may enter the line, and this stopper shall be kept in place until pipe laying is again resumed.
12. All open ends of pipelines to be abandoned, exposed during construction operations, shall have their openings plugged with a two (2) foot minimum thickness of concrete.
13. All dead-ends of pipelines, and fittings, shall be provided with standard plugs and caps either temporarily or permanently as directed by the Engineer. A concrete or other approved thrust blocking shall be provided at all dead ends. Where plugged or capped outlets are to be tied to fittings with clamps and tie rods, as indicated on the Contract Documents, the minimum number and size of rods and other pertinent details shall be as shown and/or specified.
14. Anchorages, buttresses, and thrust blocks shall be used to secure all caps, plugs, horizontal and vertical bends, branches, tees, and dead ends. They shall be constructed in accordance with the Drawing details, unless otherwise specified, and shall bear against solid, undisturbed earth.
15. Place underground warning tape in the trench above all underground pipeline installations.

B. Ductile Iron Pipe and Fittings

1. Unless otherwise specified, install pipe and fittings in accordance with
2. paragraph entitled "General Requirements" and with the requirements of AWWA C600 for pipe installation, joint assembly, valve-and-fitting installation, and thrust restraint.
3. Make push-on joints with the gaskets and lubricant specified for this type joint; assemble in accordance with the applicable requirements of AWWA C600 for joint assembly.
4. Make mechanical joints with the gaskets, glands, bolts, and nuts specified for this type joint; assemble in accordance with the applicable requirements of AWWA C600 for joint assembly and the recommendations of Appendix A to AWWAC111/A21.11.
5. Assemble joints made with sleeve-type mechanical couplings in accordance with the recommendations of the coupling manufacturer.
6. The maximum allowable deflection shall be as given in AWWA C600. If the alignment requires deflection in excess of the above limitations, special bends or a sufficient number of shorter lengths of pipe shall be furnished to provide angular deflections within the limit set forth.
7. Provide concrete thrust blocks for pipe anchorage in accordance with the requirements of AWWA C600 for thrust restraint, except that size and positioning of thrust blocks shall be as indicated.

C. Copper Pipe and Fittings

1. Copper tubing shall not be installed in the same trench with ferrous piping materials. Where copper tubing crosses any ferrous piping, provide a minimum vertical separation of 12 inches between pipes.
2. Install pipe and fittings in accordance with paragraph entitled "General Requirements" and with the applicable requirements of AWWA C600 for pipe installation, unless otherwise specified.
3. Cut copper tubing with square ends; remove fins and burrs.
4. Handle tubing carefully; replace dented, gouged, or otherwise damaged tubing with undamaged tubing.
5. Make solder joints using specified ASTM B32 solder. Solder and flux shall contain not more than 0.2 percent lead. Before making joint, clean ends of tubing and inside of fitting or coupling with wire brush or abrasive. Apply a rosin flux to the tubing end and on recess inside of fitting or coupling. Insert tubing end into fitting or coupling for the full depth of the recess and solder.

D. PVC Pressure Pipe and Fittings

1. Unless otherwise specified, install pipe and fittings in accordance with paragraph entitled "General Requirements with the requirements of UBPPA UNI-B-3 for laying of pipe, joining PVC pipe to fittings and accessories, and setting of hydrants, valves, and fittings; and with the recommendations for pipe joint assembly and appurtenance installation in AWWA M23.
2. Make push-on joints with the elastomeric gaskets specified for this type joint, using either elastomeric-gasket bell-end pipe or elastomeric-gasket couplings. For pipe-to-pipe push-on joint connections, use only pipe with push-on joint ends having factory-made bevel. Use an approved lubricant recommended by the pipe manufacturer for push-on joints. Assemble pushon joints for pipe-to-pipe joint connections in accordance with the requirements of UBPPA UNI-B-3 for laying the pipe and the recommendations in AWWA M23 for pipe joint assembly.
3. Make mechanical joints with the gaskets, glands, bolts, nuts, and internal stiffeners previously specified for this type joint; assemble in accordance with the requirements of UBPPA UNI-B-3 for joining PVC pipe to fittings and accessories, with the applicable requirements of AWWA C600 for joint assembly, and with the recommendations of Appendix A to AWWA CI 11/A21.11. Cut off spigot end of pipe for mechanical-joint connections and do not re-bevel.
4. Assemble joints made with sleeve-type mechanical couplings in accordance with the recommendations of the coupling manufacturer using internal stiffeners as previously specified for compression-type joints.
5. Maximum offset in alignment between adjacent pipe joints shall be as recommended by the manufacturer and approved by the Engineer, but shall not exceed 5 degrees.
6. Provide concrete thrust blocks for pipe anchorage in accordance with the requirements of UBPPA UNI-B-3 for reaction or thrust blocking and plugging of dead ends, except that size and positioning of thrust blocks shall be as indicated. Thrust blocks shall be constructed in accordance with Article BUTTRESSES AND THRUST BLOCKS FITTINGS.
7. Fittings shall be installed in accordance with AWWA C605.

E. PVC Gravity Pipe and Fittings

1. Install pipe and fittings in accordance with paragraph entitled "General Requirements" of this section and with the requirements of ASTM D2321 for laying and joining pipe and fittings.
2. Gravity pipe alignment shall be maintained through the use of laser alignment equipment.
3. Lay non-pressure pipe with the bell ends in the upgrade direction.
4. Make joints with the gaskets specified for joints with this piping and assemble in accordance with the requirements of ASTM D2321 for assembly of joints.
5. Make joints to other pipe materials in accordance with the recommendations of the plastic pipe manufacturer.

F. Installation of Valves

1. Install gate valves, AWWA C509, in accordance with the requirements of AWWA C600 for valve-and-fitting installation and with the recommendations of the Appendix ("Installation, Operation, and Maintenance of Gate Valves") to AWWA C509.
2. Install gate valves on PVC water mains in accordance with the recommendations for appurtenance installation in AWWA M23.
3. Make and assemble joints to gate valves as specified for making and assembling the same type joints between pipe and fittings.

3.3 ABOVE GROUND OR EXPOSED PIPING FOR LIQUIDS

A. General Requirements

1. Exposed piping shall be run as straight as practical along the alignment shown on the contract drawings and with a minimum of joints.
2. Piping and appurtenances shall be installed in conformance with reviewed shop drawings, manufacturer's instructions and ASME B31.3.
3. Piping shall be installed without springing or forcing the pipe.
4. Pipe, fittings, valves and appurtenances shall be handled with proper equipment and care according to manufacturer's recommendations and ASME B31.3 for pressure pipe. Remove protective coatings prior to installation according to manufacturer's recommendation.
5. All pipe and fittings shall be cleaned before installation and kept clean and dry. Foreign material shall be prevented from entering the pipe by using caps, plugs or covers.
6. Gaskets shall be wiped clean prior to installation. Flexible couplings and flanged coupling adapter gaskets shall be lubricated with the manufacturer's standard lubricant before installation on the pipe ends. Couplings, service saddles, and anchor studs shall be installed in accordance with manufacturer's instructions.
7. Adjoining pipe, valves and/or equipment to be joined by flanges shall be blocked and shimmed to true elevation with bolt holes in perfect alignment before bolts are inserted and tightened. Bolts shall be tightened progressively, drawing up bolts on opposite sides a little at a time until all bolts have a uniform tightness. Torque-limiting wrenches shall be used to tighten bolts. Drawing skewed joints into alignment by tightening flange bolts will not be permitted.
8. Whenever a pipe requires cutting to fit in the line to bring it to the required location, the Work shall be done without extra compensation, in a satisfactory manner so as to leave a smooth end perpendicular to the axis of the pipe.

9. Before any joints are actually made, demonstrate to the Engineer, by making a sample joint, that the methods employed conform to specifications and will secure a watertight joint.
10. Group piping whenever practical at common elevations.
11. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
12. Provide all pipe supports independent of equipment.

B. PVC Pipe and Fittings

1. All plastic pipe shall be cut, made up, and installed in accordance with the pipe manufacturer's recommendations.
2. Schedule 80 threaded nipples shall be used where necessary to connect to threaded valves or fittings. Strap wrenches shall be used for tightening threaded plastic joints, and care shall be taken not to over tighten these fittings.
3. Adequate ventilation shall be provided when working with pipe joint solvent cement and the handling of solvent cements, primers and cleaners shall be in accordance with ASTM F402.
4. Provide and install supports and hangers as specified and shown on the contract drawings.
5. Where plastic pipe is subjected to severe temperature fluctuations, provisions for expansion and contraction must be provided. This shall be accomplished with the use of expansion joints and offset piping arrangements.
6. Solvent-cemented joints shall be constructed in accordance with ASTM D2855.

C. Installation of Valves

1. Valves shall be located in accordance with the contract drawings where actuators are shown. Where actuators are not shown, valves shall be located and oriented to permit easy access to the valve operator, and to avoid interferences.
2. Flanged valve bolt holes shall be installed so as to straddle the vertical centerline of pipe.
3. Flanged faces shall be cleaned prior to inserting the gasket and bolts, and then the nuts shall be tightened progressively and uniformly.
4. Threaded ends shall have the threads cleaned by wire brushing or swabbing prior to installation.
5. The operating stem of a manual valve shall be installed in a vertical position when the valve is installed in horizontal runs of pipe having centerline elevations 4.5 feet or less above finished floor, unless otherwise shown on contract drawings. The operating stem of a manual valve shall be installed in a horizontal position in horizontal runs of pipe having centerline elevations between 4.5 feet and 6.75 feet above finish floor, unless otherwise shown on contract drawings.
6. Automatic valves shall be installed in accordance with the manufacturer's instructions and approved drawings.
7. Orientation of butterfly valves shall take into account changes in pipe direction. Valve shafts shall be oriented so that unbalanced flows caused by pipe direction changes or other disturbances are equally divided to each half of the disc.
8. If a plug valve seat position is not shown in the contract drawings, locate the seat position as follows: for horizontal flow, the flow shall produce an "unseating" pressure, and the plug shall open into the top half of valve; and for vertical flow, the seat shall be installed in the highest portion of the valve.

9. A line size ball valve and union shall be installed upstream of each solenoid valve, in-line flow switch, or other in-line electrical device, excluding magnetic flow meters, for isolation during maintenance.
 10. Where the depth of the valve is such that its centerline is more than 3 feet below grade, an operator extension stem shall be furnished with a 2 inch operating nut to bring the operating nut to a point 5.9 inches below the surface of the ground and/or box cover. The operating nut shall be located in a floor box.
 11. Chain wheel and guide assemblies or chain lever assemblies shall be installed on manually operated valves located over 6.73 feet above finished floor elevation. Where chains hang in normally traveled areas, appropriate tie-back anchors shall be used.
- D. Backflow preventers shall be installed with nameplate and test cocks accessible from front of unit, and with a minimum clearance of 12.2 inches between the port and grade. The assemblies shall be installed in accordance with local codes and shall discharge to an open drain with an air gap; vertical installation is prohibited.

3.4 AIR PIPE

A. Installation

1. Install according to manufacturer recommendations.
2. Use hangers no greater than 24" apart.
3. Welds at job site shall follow manufacturer's recommendations.
4. Remove heat stains at welds.
5. Do not use flange bolts to draw pipe together that is misaligned.

3.5 TESTING

- A. All testing for defects and for leakage shall be performed in the presence of the Engineer. All defects in workmanship rejected by the Engineer shall be promptly corrected by the Contractor and defective material removed from the Project site.
- B. Testing Gravity Flow Pipe
1. 1. The Contractor shall furnish all labor, tools, materials including water and equipment including mirrors, flashlights or other artificial lighting, weirs, pump, compressors, stopwatch, gauges, and meters, subject to the approval of the Engineer for testing in accordance with these Specifications.
 - a. All branch fittings and ends of lateral stubs shall be securely plugged to withstand the internal test pressures. The section of line being tested shall also be securely plugged at each manhole. All stoppers shall be adequately braced when received.
 - b. Air shall be slowly supplied to the plugged pipeline until the internal air pressure reaches 8.0 pounds per square inch. At least two minutes shall be allowed for temperature stabilization before proceeding further with the test.
 - c. The rate of air loss shall then be determined by measuring the time interval required for the internal pressure to decrease by 1.0 pound per square inch (psi).

- d. The line shall be considered acceptable if the time required for the 1.0 psi pressure drop is not less than 10 minutes.

C. Testing Air Pipe

- 1. Air pipe shall be tested the same as gravity flow pipe except the test pressure shall be 12 psi.

D. Testing Full Flow Pipe

- 1. The Contractor shall furnish all labor, tools, materials, water and equipment for testing in accordance with these specifications.
- 2. Notify Engineer in advance of all tests.
- 3. All pipe, materials and equipment necessary for tests shall be adequately braced and supported during the test to prevent movement, displacement, or damage during application of test pressure.
- 4. Allow cement thrust blocks to set before testing.
- 5. Cap and brace test ends of piping as required to withstand test pressure and
- 6. Allow adequate drying time based on manufacturer's recommendation for solvent welded joints prior to testing.
- 7. Pressure Pipe (Greater Than 6 psi Working Pressure)

- a. All pressure pipe shall be tested in accordance with AWWA C600, Installation of Ductile Iron Water Mains and their Appurtenances.
- b. Pressure pipe shall be tested at a minimum pressure of 100 psi.
- c. No pipe installation shall be accepted if the leakage is greater than the value calculated for allowable leakage.

Allowable leakage per 1,000 ft. of pipeline*

Nominal Pipe Diameter (in)	<u>Allowable leakage at 100 psi</u> <u>(gph)/1000 ft</u>
1-1/4	0.09
3	0.23
4	0.30
6	0.45
8	0.60
10	0.75
12	0.90
14	1.05
16	1.20

If the pipeline contains sections of various diameters, the allowable leakage will be the sum of computed leakage for each size.

*Taken from AWWA C600-87.

3.6 BUTTRESSES AND THRUST BLOCKS

- A. Buttresses or thrust blocks shall be installed on in accordance with the requirements of AWWA C600 on all below grade pipe lines at all valves, bends, tees, caps, plugs, dead ends and at reducers

or other fittings where changes in direction or pipe size occur unless otherwise indicated on Drawings. The buttresses and thrust blocks shall be sized as shown on the Drawing details.

- B. Cold weather protection shall be provided, during freezing weather, for all masonry, mortar and concrete construction connection with the piping by maintaining a temperature of not less than 60 degrees F for a period of three (3) days.

3.7 PROTECTION OF INSTALLED WORK

- A. Protect installed pipe, joints, fittings and appurtenances from damage or displacement during the backfilling process or other construction activities.
- B. Keep pipe interior free from debris. Stopper open ends of pipe each day and until next length of pipe is laid.

3.8 ADJUSTING

- A. Adjust Work in accordance with Section 01700 and manufacturer's instructions.

END OF SECTION

SECTION 15140
SUPPORTS AND ANCHORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes
 - 1. Hangers, supports, brackets and anchors.
- B. Related Sections
 - 1. Division 15 Section 15000 – “Supports and Anchors”

1.3 REFERENCES

- A. American Society of Mechanical Engineers (ASME) B31.3 Process Piping.
- B. ASTM International (ASTM) A194 Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both.
- C. Manufacturers' Standardization Society (MSS) SP-58 Pipe Hangers and Supports - Materials, Design and Manufacture.
- D. Manufacturers' Standardization Society (MSS) SP-69 Pipe Hangers and Supports - Selection and Application.
- E. Manufacturers' Standardization Society (MSS) SP-89 Pipe Hangers and Supports — Fabrication and Installation Practices.

1.4 DESIGN REQUIREMENTS

- A. Support systems shall be selected and designed in accordance with ASME B31.3, MSS SP-58, and MSS SP-69 within the specified spans and component requirements.
- B. The absence of pipe supports and details on the contract drawings does not relieve the Contractor of responsibility for sizing and providing supports throughout project.
- C. Where pipe supports contact bare piping or in-line devices, provide supports of compatible material so that neither shall have a deteriorating action on the other.

- D. Establish maximum load ratings with consideration for allowable stresses prescribed by ASME B33 or MSS SP-58.
- E. Ensure that supports, guides and anchors do not transmit excessive quantities of heat to building structure.
- F. Utilize hangers and supports to support systems under all conditions of operation, to allow free expansion and contraction, and to prevent excessive stresses from being introduced into pipework or connected equipment.

1.5 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data:
 - 1. Include data on materials, fittings and accessories.
 - 2. Include Product description, model, dimensions, component sizes, rough-in requirements, service sizes and finishes.
 - 3. Include Product performance data.
- C. Shop Drawings:
 - 1. Provide support system detail drawings, indicating components, dimensions, and connections to structures, equipment and piping.
 - 2. Provide as-built drawings showing pipe supports, anchors, and guides.
- D. Manufacturer's Installation Instruction: Provide installation details and component assembly procedures.

1.6 OPERATION AND MAINTENANCE DATA

- A. Submit under provisions of Sections 01300 and 01700.
- B. Maintenance Data: Include methods for maintaining installed products, precautions against cleaning materials and methods detrimental to finishes and performance, inspection requirements, replacement part numbers and availability.

1.7 QUALITY ASSURANCE

- A. Perform Work in accordance with State and local regulations and Section 01400.
- B. Perform Work in accordance with manufacturer's installation instructions.
- C. Fabrication and installation of pipe hangers and supports shall conform to the latest requirements of ASME B31.3 and MSS SP-89.
- D. Utilize an installer who is experienced in installation of the work of this section and per the minimum requirements of MSS SP-89.

1.8 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, protect and handle Products to site under provisions of Section 01610.
- B. Equipment shall be delivered to the site in shipping containers with labeling in place. Inspect for damage prior to accepting delivery. Maintain shipping packaging in place until installation.
- C. Materials delivered and placed in storage shall be stored with protection from the weather, excessive humidity variation, excessive temperature variation, dirt, dust and/or other contaminants.
- D. Proper protection and care of material before, during and after installation is the Contractor's responsibility. Any material found to be damaged shall be replaced at the Contractor's expense.

1.9 WARRANTY

- A. Provide warranty under provisions of Sections 01700 and 01740.

1.10 MAINTENANCE SERVICE

- A. Furnish service and maintenance for one year from Date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Standard Products: Provide material and equipment that are the standard products of the manufacturers listed and that essentially duplicate items that have been in satisfactory use for at least 1 year prior to bid opening. Nominal sizes for standardized products shall be used.
 - 1. B-Line Systems, Inc., 509 West Monroe Street, Highland, Illinois 62249-0326 (618) 654-2184 www.b-line.com
 - 2. Anvil International, 110 Corporate Drive, Suite 10 • P.O. Box 3180, Portsmouth, NH 03802-3180 Ph: 603-422-8000 • Fax: 603-422-8033. www.anvilintl.net
 - 3. TOLCO, 1375 Sampson Avenue, Corona, California 92879. Ph: 951-737-5599 / 800.786.5266 Fax: 951-737-0330 www.nibco.com
 - 4. Standon Material Resources Inc., 2800 Taylor way Bldg. 2-C P.O. Box 247, Forrest Grove, OR 97116. Toll Free - (877)693-0727 Fax - (503)533-5501 www.standon.net
- B. Substitutions: Under provisions of Section 01630.

2.2 UPPER ATTACHMENTS

- A. Ceiling Flanges: AISI Type 304 stainless steel for attachment to wood beams, ceilings, or metal decks.

- B. Concrete Plates: AISI Type 304 stainless steel for structural attachment to concrete ceiling where flexibility is desired. Use type where the hanger rod attaches directly to support bracket. Before installation ensure that concrete and anchorage are sufficient to carry the load.
- C. Concrete Inserts
 - 1. Cast in place spot concrete inserts shall be used where applicable; stainless steel body. Spot inserts shall allow for lateral adjustment and have means for attachment to forms. Select inserts to suit threaded hanger rod sizes.
 - 2. Continuous concrete inserts shall be used where applicable. Channels shall be AISI Type 304 stainless steel, complete with styrofoam inserts and end caps with nail holes for attachment to forms. The continuous concrete insert shall have a load rating of not less than 2,000 lbs/ft. in concrete. Select channel nuts suitable for strut and rod sizes.

2.3 HANGERS

- A. Hangers shall be fabricated of AISI Type 304 stainless steel.
- B. All hangers shall be of a uniform type and material for a given pipe run and application.
- C. Coated or plated hangers shall be used to isolate hangers from dissimilar metal tube or pipe.
- D. Hangers shall incorporate a means of vertical adjustment after erection while supporting the load. The minimum available adjustment shall be 1.5 inches.
- E. For piping systems with liquid temperatures up to 122 degrees F the following shall be used: MSS SP-58 Types 1, 3 through 12, Types 24 and 26 with overhead support, or Types 35 through 38 with support from below.

2.4 PIPE CLAMPS

- A. When flexibility in the hanger assembly is required due to horizontal movement, use pipe clamps. For non-insulated pipe, use standard pipe clamps.
- B. Where pipes are indicated as offset from wall surfaces, supply a double-leg design two-piece pipe clamp.

2.5 MULTIPLE PIPE RACKS AND TRAPEZE HANGERS

- A. Multiple pipe racks or trapeze hangers shall be fabricated from AISI Type 304 stainless steel and designed to suit the conditions at the points of installation.
- B. Pipes shall be kept in their relative positions to each other by the use of 2 piece clamps or clips sized for outside diameter of pipe.
- C. Pipelines subject to thermal expansion must be free to slide or roll.

2.6 HANGER RODS

- A. Hanger Rods shall be AISI Type 304 stainless steel rod threaded at both ends or continuous threaded rods of circular cross section. Use ASTM A 194 GR F8 stainless steel adjusting locknuts at upper attachments and hangers.
- B. Wire, chain, or perforated straps are not allowed.

2.7 WALL SUPPORTS

- A. MSS SP-58 Types 31 through 33, stainless steel AISI Type 304, pre-punched with a minimum of two fastener holes designed for supporting pipe from walls or structures. Provide adjustable strut where lateral adjustment is required.

2.8 FLOOR SUPPORTS

- A. Adjustable pipe saddle support with yoke, stainless steel AISI Type 304, designed for support of horizontal pipe from floor stanchions where vertical adjustment is required, with u-bolt and hex nuts to hold pipe securely to saddle, stainless steel AISI Type 304 and unthreaded square base plate stand with anchor holes, stainless steel AISI Type 304.
- B. Adjustable flanged pipe supports, AISI Type 304 stainless steel with 1/4" stainless steel base plate, stainless steel extension pipe per manufacture's recommendation and stainless steel anchors, bolts and nuts.

2.9 RISER CLAMPS

- A. Vertical runs of piping shall be supported at each floor, or closer where required, with AISI Type 304 stainless steel clamps bolted around pipes and attached to the building construction.

2.10 COPPER PIPING SUPPORTS

- A. The copper piping system shall be supported using epoxy-painted copper, padded stainless steel, or PVC coated stainless steel piping supports that conform to MSS SP-58, MSS SP-69 and MSS SP-89.
- B. Conventional steel and galvanized pipe hangers shall not be used for copper piping systems.
- C. All valves, instruments and other equipment attached to the copper piping system shall be individually supported.

2.11 PLASTIC PIPING SUPPORTS

- A. V-Bottom clevis, standard clevis, or split ring type hanger with 18-gauge stainless steel support channel or protective sleeve to form support system for plastic pipe or flexible tubing.

2.12 SUPPLEMENTAL STEEL

- A. Provide supplemental steel where the support of piping systems and equipment is required between building structural elements.
- B. Supplemental steel shall be designed per AISC Steel Construction Manual and Local Building Codes.
- C. The Contractor has the option to use pre-engineered support systems. However, a mixture of support system manufacturers' products is not permitted.
- D. Supplemental steel shall be AISI TP304 stainless steel.

2.13 PIPE GUIDES

- A. Intermediate Guides
 - 1. For piping 6 inch and smaller, a pipe clamp with an oversize pipe sleeve shall be provided for a minimum 0.16 inch clearance.
 - 2. For piping 8 inch and larger, U-bolts with double nuts that are manufactured for the purpose shall be used to provide a minimum 0.28 inch clearance around pipe. The stock sizes for the U-bolts are as follows:
 - a. For a 8 inch pipe use a 0.625 inch U-bolt
 - b. For a 10 inch pipe, use a 3/4 inch U-bolt
 - c. For a 12 inch to 16 inch pipe, use a 0.875 inch U-bolt
 - d. For 18 inch to 30 inch pipes use 1 inch U-bolts.
- B. Alignment Guides
 - 1. For piping, 8 inch and smaller, alignment guides shall be stainless steel, spider or sleeve type.
 - 2. For piping, 10 inch and larger, alignment guides shall be stainless steel, roller type guides.

2.14 ANCHORS AND FASTENERS

- A. Impact expansion (hammer and explosive charge drive-type) anchors and fastener systems are not acceptable. Lead shields, plastic or fiber inserts, and drilled-in plastic sleeve/nail drive systems are also not acceptable.
- B. Drilled-In Expansion Anchors and Fasteners
 - 1. For masonry brick and precast concrete hollow-core block anchoring/fastening systems:
 - a. Anchors shall be designed to accept both machine bolts and/or threaded rods. Such anchors shall consist of an expansion shield and expander nut contained inside the shield.
 - b. The expander nut shall be fabricated and designed to climb the bolt or rod thread and simultaneously expand the shield as soon as the threaded item, while being tightened, reaches, and bears against the shield bottom.

- c. The shield body shall consist of four legs, the inside of each shall be tapered toward shield bottom (or nut end). The end of one leg shall be elongated and turned across shield bottom. The outer surface of shield body shall be ribbed for grip-action.
 - d. The expander nut shall be of square design with sides tapered inward from bottom to top.
 - e. The anchor materials of construction shall be TP304 stainless steel of 43,541 psi minimum tensile strength.
 - f. Fasteners shall be machine bolts for use with above anchors; nuts and washers shall conform to ASTM A 194/A 194M.
 - g. The anchor length, diameter, and embedment depth shall meet the manufacturer's requirements for the maximum allowable working load of the application.
2. For cast-in-place concrete and solid precast concrete structural elements:
- a. The anchor/fastener assembly shall be UL listed with a one-piece stud (bolt) that has integral expansion wedges, nuts and washers.
 - b. The stud shall be constructed of TP304 stainless steel, and nut and washer of TP304 stainless steel.
 - c. The anchor length, diameter, and embedment depth shall meet the manufacturer's requirements for the maximum allowable working load of the application.

C. Drilled-In Adhesive Anchors

1. Drilled-in adhesive anchors shall not be used for overhead applications.
2. The anchors shall be composed of an anchor rod assembly and an anchor rod adhesive cartridge.
3. The anchor rod assembly shall be a chamfered and threaded stud rod of TP304 stainless steel with a nut and washer of TP316 stainless steel.
4. The anchor length, diameter, and embedment depth shall meet the manufacturer's requirements for the maximum allowable working load of the application.
5. The adhesive cartridge shall be a sealed capsule containing premeasured amounts of resin, quartz sand aggregate, and a hardener contained in a separate vial within the capsule. The capsule ingredients shall be activated by the insertion procedure of the anchor rod assembly.

2.15 THRUST BLOCKS

- A. Concrete: 3,000 psi in accordance with Section 03300.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. After becoming familiar with all details of the work, verify all dimensions in the field, and advise the Engineer of any discrepancy before performing the work.

3.2 INSTALLATION

- A. The absence of pipe supports and details on the contract drawings shall not relieve the Contractor of responsibility for sizing and providing supports throughout project.
- B. Install pipe support system in accordance with manufacturer's instructions.
- C. All pipe hangers and supports allow for the expansion and contraction of the piping system.
- D. Design hangers to provide assembly without disengagement of supported pipe.
- E. Piping connections to equipment shall be supported by pipe supports and not off the equipment.
- F. Large or heavy valves, fittings, and/or equipment shall be supported independently of associated piping.
- G. Pipes shall not be supported off other pipes.
- H. Supports shall be provided at piping changes in direction or in elevation, adjacent to flexible joints and couplings, and where otherwise shown on the contract drawings. Place supports within 12 inches of each horizontal elbow.
- I. Coordinate placement of pipe support system with the installation of other Work.
- J. Pipe supports and hangers shall not be installed in equipment access areas, bridge crane runs, doorways, designated pedestrian or vehicle travel pathways or as to interfere with use of space or other Work.
- K. Hanger rods shall be subjected to tension only and must not exceed four-degrees from vertical.
- L. At each channel type support, every pipe shall be provided with an intermediate pipe guide, except where pipe anchors are required.
- M. Existing support systems may be used to support additional new piping only if the Contractor can demonstrate that the existing support systems are adequate for the additional loads, or if the existing systems are strengthened to support the additional loads.
- N. Pedestal type pipe supports shall be provided under base flanges adjacent to rotating equipment and where required to isolate vibration.
- O. Dielectric barriers shall be installed between supports and copper or stainless steel piping, and between stainless steel supports and non-stainless steel ferrous piping.

3.3 SUPPORT METHODS

- A. Piping support shall be provided as specified and as shown in the contract drawings.
- B. Single horizontal suspended piping shall be supported by adjustable swivel-ring, split-ring, or clevis hangers.
- C. Multiple horizontal suspended piping shall be supported by trapeze hangers with channel type supports.

- D. Horizontal pedestal mounted piping shall have saddle with yolk type supports. Horizontal piping with a centerline elevation of less than 4 feet shall be supported from the floor.
- E. Horizontal wall mounted piping shall have wall brackets.
- F. Vertical piping shall be supported independently of any connected horizontal pipe by wall brackets, base elbows, or riser clamps on floor penetrations.
- G. Support and provide thrust blocking for underground piping per details on accompanying Drawings.

3.4 SUPPORT FOR PVC PIPING

- A. Support horizontal PVC piping using V-Bottom clevis, standard clevis or split ring type hangers. Provide at each location an 18 gauge stainless steel protective sleeve, minimum 6" long, to increase bearing area.
- B. At valves 2" and larger, provide additional support at valve location to reduce torque on piping run.
- C. Support PVC in accordance with the following schedule:
 - 1. 1/2" to 3/4" - 4' OC.
 - 2. 1" - 4-1/2' O.C..
 - 3. 1-1/4" to 2" - 5' OC.
 - 4. 2-1/2" to 3" - 6' O.C.
 - 5. 3-1/2" to 4" - 6-1/2' O.C.

END OF SECTION

DIVISION 16
ELECTRICAL

SECTION 16060
GROUNDING AND BONDING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes: Grounding systems and equipment.
- B. Section includes grounding systems and equipment, plus the following special applications: Service grounding.
- C. Underground distribution grounding.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Field quality-control reports.

1.4 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Member company of NETA or an NRTL.
 - 1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Comply with UL 467 for grounding and bonding materials and equipment.

PART 2 - PRODUCTS

2.1 CONDUCTORS

- A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.

- B. Bare Copper Conductors:
 - 1. Solid Conductors: ASTM B 3.
 - 2. Stranded Conductors: ASTM B 8.
 - 3. Tinned Conductors: ASTM B 33.

2.2 CONNECTORS

- A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.
- B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, pressure type with at least two bolts.
 - 1. Pipe Connectors: Clamp type, sized for pipe.
- C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

2.3 GROUNDING ELECTRODES

- A. Ground Rods: Copper-clad steel; 3/4 inch by 10 feet (19 mm by 3 m) in diameter.

PART 3 - EXECUTION

3.1 GROUNDING UNDERGROUND DISTRIBUTION SYSTEM COMPONENTS

- A. Comply with IEEE C2 grounding requirements.
- B. Grounding Manholes and Handholes: Install a driven ground rod through manhole or handhole floor, close to wall, and set rod depth so 4 inches (100 mm) will extend above finished floor. If necessary, install ground rod before manhole is placed and provide No. 10 AWG bare, tinned copper conductor from ground rod into manhole through a waterproof sleeve in manhole wall. Protect ground rods passing through concrete floor with a double wrapping of pressure-sensitive insulating tape or heat-shrunk insulating sleeve from 2 inches (50 mm) above to 6 inches (150 mm) below concrete. Seal floor opening with waterproof, nonshrink grout.
- C. Grounding Connections to Manhole Components: Bond exposed-metal parts such as inserts, cable racks, pulling irons, ladders, and cable shields within each manhole or handhole, to ground rod or grounding conductor. Make connections with No. 4 AWG minimum, stranded, hard-drawn copper bonding conductor. Train conductors level or plumb around corners and fasten to manhole walls. Connect to cable armor and cable shields according to written instructions by manufacturer of splicing and termination kits.

3.2 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with all feeders and branch circuits.

3.3 INSTALLATION

- A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- B. Ground Rods: Drive rods until tops are 2 inches (50 mm) below finished floor or final grade unless otherwise indicated.
 - 1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
 - 2. For grounding electrode system, install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.

3.4 LABELING

- A. Comply with requirements of NFPA 70 for instruction signs. The label or its text shall be green.

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Tests and Inspections:
 - 1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
 - 2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
 - 3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal. Make tests at ground rods before any conductors are connected.
 - a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
 - b. Perform tests by fall-of-potential method according to IEEE 81.
- C. Grounding system will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.
- E. Report measured ground resistances that exceed 100 ohms.

- F. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

END OF SECTION

SECTION 16073

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Hangers and supports for electrical equipment and systems.
 - 2. Construction requirements for concrete bases.

1.3 DEFINITIONS

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

1.4 PERFORMANCE REQUIREMENTS

- A. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed for this Project, with a minimum structural safety factor of five times the applied force.

1.5 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Steel slotted support systems.
 - 2. Support components.

1.6 QUALITY ASSURANCE

- A. Comply with NFPA 70.

1.7 COORDINATION

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

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.
 - 1. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
 - 2. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
 - 3. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA4.
 - 4. Channel Dimensions: Selected for applicable load criteria.
- B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.
- C. Conduit and Cable Support Devices: Galvanized steel and malleable-iron hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- D. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
 - 1. Mechanical-Expansion Anchors: Insert-wedge-type, stainless steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
 - 2. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
 - 3. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
 - 4. Through Bolts: Structural type, hex head, and high strength. Comply with
 - 5. ASTM A 325.
 - 6. Toggle Bolts: All-steel springhead type.
 - 7. Hanger Rods: Threaded steel.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.

- B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch in diameter.
- C. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

3.2 SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.
- B. Raceway Support Methods: In addition to methods described in NECA 1, EMT, IMC, and RMC may be supported by openings through structure members, as permitted in NFPA 70.
- C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.
- D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
 - 1. To Wood: Fasten with lag screws or through bolts.
 - 2. To New Concrete: Bolt to concrete inserts.
 - 3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
 - 4. To Existing Concrete: Expansion anchor fasteners.
 - 5. To Light Steel: Sheet metal screws.
 - 6. Items Mounted on 1--10110w Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate.
- E. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

3.3 CONCRETE BASES

- A. Construct concrete bases of dimensions indicated but not less than 4 inches larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.
- B. Use 3000-psi, 28-day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements are specified in Section 03300 "Cast-in-Place Concrete. "
- C. Anchor equipment to concrete base.

1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor bolts to elevations required for proper attachment to supported equipment.
3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

END OF SECTION

SECTION 16901

SLEEVES AND SLEEVE SEALS FOR ELECTRICAL RACEWAYS AND CABLING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Sleeves for raceway and cable penetration of non-fire-rated construction walls and floors.
 - 2. Sleeve-seal systems.
 - 3. Grout.
 - 4. Silicone sealants.

1.3 ACTION SUBMITTALS

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

PART 2 - PRODUCTS

2.1 SLEEVES

- A. Wall Sleeves:
 - 1. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, plain ends.
- B. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies: Galvanized-steel sheet; 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint, with tabs for screw-fastening the sleeve to the board.
- C. PVC-Pipe Sleeves: ASTM D 1785, Schedule 40.
- D. Molded-PVC Sleeves: With nailing flange for attaching to wooden forms.
- E. Molded-PE or -PP Sleeves: Removable, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.

2.2 GROUT

- A. Description: Nonshrink; recommended for interior and exterior sealing openings in non-fire-rated walls or floors.
- B. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
- C. Design Mix: 5000-psi, 28-day compressive strength.
- D. Packaging: Premixed and factory packaged.

2.3 SILICONE SEALANTS

- A. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below.
 - 1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces that are not fire rated.
- B. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION FOR NON-FIRE-RATED ELECTRICAL PENETRATIONS

- A. Comply with NECA 1.
- B. Sleeves for Conduits Penetrating Above-Grade Non-Fire-Rated Concrete and Masonry-Unit Floors and Walls:
 - 1. Interior Penetrations of Non-Fire-Rated Walls and Floors:
 - a. Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint.
 - b. Seal space outside of sleeves with mortar or grout. Pack sealing material solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect material while curing.
 - 2. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
 - 3. Install sleeves for wall penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of walls. Cut sleeves to length for mounting flush with both surfaces of walls. Deburr after cutting.
 - 4. Install sleeves for floor penetrations. Extend sleeves installed in floors 2 inches above finished floor level. Install sleeves during erection of floors.
- C. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies:
 - 1. Use circular metal sleeves unless penetration arrangement requires rectangular sleeved opening.

2. Seal space outside of sleeves with approved joint compound for gypsum board assemblies.

END OF SECTION

SECTION 16120
CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Qualification Data: For testing agency.
- C. Field quality-control reports.

1.4 QUALITY ASSURANCE

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

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

- A. Copper Conductors: Comply with NEMA WC 70/1CEA S-95-658.
- B. Conductor Insulation: Comply with NEMA WC 70/1CEA S-95-658 for Type THHN-2THWN-2, or Type XHHW-2, or Type UF, or Type USE and, or Type SO.

2.2 CONNECTORS AND SPLICES

- A. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

2.3 SYSTEM DESCRIPTION

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

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders and Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Service Entrance: Type XHHW-2, or Type USE single conductors in raceway.
- B. Exposed Branch Circuits, Including in Crawlspace: Type THHN-2-THWN-2, single conductors in raceway.
- C. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless steel, wire-mesh, strain relief device at terminations to suit application.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.
- B. Complete raceway installation between conductor and cable termination points according to Section 16130 "Raceways and Boxes" prior to pulling conductors and cables.
- C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

3.4 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torque tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.
- B. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
- C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches of slack.

3.5 IDENTIFICATION

- A. Color-code conductors and cables according to NFPA 70.

3.6 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 16091 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling. "

3.7 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Perform the following tests and inspections:
 - 1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance for compliance with requirements.
 - 2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
- C. Test and Inspection Reports: Prepare a written report to record the following:
 - 1. Procedures used.
 - 2. Results that comply with requirements.
 - 3. Results that do not comply with requirements and corrective action taken to achieve compliance with requirements.
- D. Cables will be considered defective if they do not pass tests and inspections.

END OF SECTION

SECTION 16130
RACEWAYS AND BOXES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

1. Metal conduits, tubing, and fittings.
2. Nonmetal conduits, fittings including direct-buried or concrete-encased underground conduits.
3. Metal wireways and auxiliary gutters.
4. Surface raceways.
5. Boxes, enclosures, and cabinets.
6. Handholes and boxes for exterior underground cabling.

1.3 DEFINITIONS

- A. GRC: Galvanized rigid steel conduit.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Coordination Drawings: For conduits 3-inch and larger. Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of items involved:
 1. Structural members in paths of conduit groups with common supports.
 2. HVAC and plumbing items and architectural features in paths of conduit groups with common supports.

PART 2 - PRODUCTS

2.1 METAL CONDUITS, TUBING, AND FITTINGS

- A. Listing and Labeling: Metal conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

- B. GRC: Comply with ANSI C80.1 and UL 6.
- C. FMC: Comply with UL 1; zinc-coated steel.
- D. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.
- E. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.
 - 1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886 and NFPA 70.
 - 2. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.
- F. Joint Compound for GRC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 NONMETALLIC CONDUITS, TUBING, AND FITTINGS

- A. Listing and Labeling: Nonmetallic conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. RNC: Type EPC-40-PVC, complying with NEMA TC2 and UL 651 unless otherwise indicated.

2.3 BOXES, ENCLOSURES, AND CABINETS

- A. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.
- B. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.
- C. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.
- D. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb. Outlet boxes designed for attachment of luminaires weighing more than 50 lb shall be listed and marked for the maximum allowable weight.
- E. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- F. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, galvanized, cast iron with gasketed cover.
- G. Device Box Dimensions: 4 inches square by 2-1/8 inches deep

2.4 HANDHOLES AND BOXES FOR EXTERIOR UNDERGROUND WIRING

- A. General Requirements for Handholes and Boxes:

1. Boxes and handholes for use in underground systems shall be designed and identified as defined in NFPA 70, for intended location and application.
 2. Boxes installed in wet areas shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Polymer-Concrete Handholes and Boxes with Polymer-Concrete Cover: Molded of sand and aggregate, bound together with polymer resin, and reinforced with steel, fiberglass, or a combination of the two.
1. Standard: Comply with SCTE 77.
 2. Configuration: Designed for flush burial with integral closed bottom unless otherwise indicated.
 3. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure and handhole location.
 4. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
 5. Cover Legend: Molded lettering, "ELECTRIC."
 6. Conduit Entrance Provisions: Conduit-terminating fittings shall mate with entering ducts for secure, fixed installation in enclosure wall.

2.5 SOURCE QUALITY CONTROL FOR UNDERGROUND ENCLOSURES

- A. Handhole and Pull-Box Prototype Test: Test prototypes of handholes and boxes for compliance with SCTE 77. Strength tests shall be for specified tier ratings of products supplied.
1. Tests of materials shall be performed by an independent testing agency.
 2. Strength tests of complete boxes and covers shall be by either an independent testing agency or manufacturer. A qualified registered professional engineer shall certify tests by manufacturer.
 3. Testing machine pressure gages shall have current calibration certification complying with ISO 9000 and ISO 10012 and traceable to MST standards.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

- A. Outdoors: Apply raceway products as specified below unless otherwise indicated:
1. Exposed Conduit: GRC.
 2. Concealed Conduit, Aboveground: GRC.
 3. Underground Conduit: RNC, Type EPC-40-PVC, direct buried or concrete encased.
 4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
 5. Boxes and Enclosures, Aboveground: NEMA 250, Type 4.
- B. Indoors: Apply raceway products as specified below unless otherwise indicated:
1. Exposed, Not Subject to Physical Damage: EMT.

2. Exposed and Subject to Physical Damage or in Hazardous Areas: GRC. Raceway locations include the following:
 - a. Loading dock.
 - b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
 - c. Mechanical rooms.
 - d. Headworks interior.
 3. Concealed in Ceilings and Interior Walls and Partitions: EMT.
 4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
 5. Damp or Wet Locations: GRC.
 6. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 7 in hazardous locations.
- C. Minimum Raceway Size: 3/4-inch trade size.
- D. Raceway Fittings: Compatible with raceways and suitable for use and location.
1. GRC: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
 2. EMT: Use setscrew or compression, steel fittings. Comply with NEMA FB 2.10.
- E. Install surface raceways only where indicated on Drawings.

3.2 INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.
- B. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- C. Complete raceway installation before starting conductor installation.
- D. Comply with requirements in Section 16073 "Hangers and Supports for Electrical Systems" for hangers and supports.
- E. Arrange stub-ups so curved portions of bends are not visible above finished slab.
- F. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches of changes in direction.
- G. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
- H. Support conduit within 12 inches of enclosures to which attached.
- I. Raceways Embedded in Slabs:

1. Run conduit larger than 1-inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure raceways to reinforcement at maximum 10-foot intervals.
 2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
 3. Arrange raceways to keep a minimum of 2 inches of concrete cover in all directions.
 4. Do not embed thread less fittings in concrete unless specifically approved by Architect for each specific location.
- J. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
- K. Coat field-cut threads on PVC-coated raceway with a corrosion-preventing conductive compound prior to assembly.
- L. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.
- M. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch trade size and insulated throat metal bushings on 1-1/2-inch trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.
- N. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.
- O. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.
- P. Cut conduit perpendicular to the length. For conduits 2-inch trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.
- Q. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.
- R. Surface Raceways:
 1. Install surface raceway with a minimum 2-inch radius control at bend points.
 2. Secure surface raceway with screws or other anchor-type devices at intervals not exceeding 48 inches and with no less than two supports per straight raceway section. Support surface raceway according to manufacturer's written instructions. Tape and glue are not acceptable support methods.
- S. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings according to NFPA 70.
- T. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:

1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
2. Where an underground service raceway enters a building or structure.
3. Where otherwise required by NFPA 70.

U. Expansion-Joint Fittings:

1. 1. Install expansion fittings at all locations where conduits cross building or structure expansion joints.

V. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 72 inches of flexible conduit for equipment subject to vibration, noise transmission, or movement; and for transformers and motors.

1. Use LFMC in Non-hazardous, damp or wet locations subject to physical damage.

W. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements.

X. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box.

Y. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.

Z. Locate boxes so that cover or plate will not span different building finishes.

AA. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

3.3 INSTALLATION OF UNDERGROUND CONDUIT

A. Direct-Buried Conduit:

1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Section 02221 "Trench Excavation, Backfilling and Compaction." Install backfill as specified in Section 02221 "Trench Excavation, Backfilling and Compaction. "
2. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Section 02221 "Trench Excavation, Backfilling and Compaction. "
3. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through floor unless otherwise indicated. Encase elbows for stub-up ducts throughout length of elbow.

4. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through floor.
 - a. Couple steel conduits to ducts with adapters designed for this purpose and encase coupling with 3 inches of concrete for a minimum of 12 inches on each side of the coupling.
 - b. For stub-ups at equipment mounted on outdoor concrete bases and where conduits penetrate building foundations, extend steel conduit horizontally a minimum of 60 inches from edge of foundation or equipment base. Install insulated grounding bushings on terminations at equipment.
5. Underground Warning Tape: Provide detectable laminate, red colored — inscribed "ELECTRIC."

3.4 INSTALLATION OF UNDERGROUND HANDHOLES AND BOXES

- A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting conduits to minimize bends and deflections required for proper entrances.
- B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch sieve to No. 4 sieve and compacted to same density as adjacent undisturbed earth.
- C. Elevation: In paved areas, set so cover surface will be flush with finished grade. Set covers of other enclosures 1 inch above finished grade.

3.5 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 16091 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling. "

3.6 PROTECTION

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

END OF SECTION

SECTION 16140
WIRING DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Receptacles, receptacles with integral GFCI, and associated device plates.
 - 2. Snap switches.
 - 3. Wall-switch.
 - 4. Communications outlets.

1.3 DEFINITIONS

- A. EMI: Electromagnetic interference.
- B. GFCI: Ground-fault circuit interrupter.
- C. Pigtail: Short lead used to connect a device to a branch-circuit conductor.
- D. RFI: Radio-frequency interference.
- E. TVSS: Transient voltage surge suppressor.
- F. UTP: Unshielded twisted pair.

1.4 ACTION SUBMITTALS

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers' Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:

1. Cooper Wiring Devices; Division of Cooper Industries, Inc. (Cooper).
2. Hubbell Incorporated; Wiring Device-Kellems (Hubbell).
3. Leviton Mfg. Company Inc. (Leviton).
4. Pass & Seymour/Legrand (Pass & Seymour).

2.2 GENERAL WIRING-DEVICE REQUIREMENTS

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

2.3 STRAIGHT-BLADE RECEPTACLES

- A. Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD6 Configuration 5-20R, UL 498, and FS W-C-596.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Cooper; CR5362 (duplex).
 - b. Hubbell; HBL5352 (duplex).
 - c. Leviton; 5352 (duplex).
 - d. Pass & Seymour; 5362 (duplex).

2.4 GFCI RECEPTACLES

- A. General Description:
 1. Straight blade, feed-through type.
 2. Comply with NEMA WD 1, NEMA WD 6, UL 498, UL 943 Class A, and FS W-C-596.
 3. Include indicator light that shows when the GFCI has malfunctioned and no longer provides proper GFCI protection.
- B. Duplex GFCI Convenience Receptacles, 125 V, 20 A:
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Cooper; VGF20.
 - b. Hubbell; GFR5352L.
 - c. Pass & Seymour; 2095.
 - d. Leviton; 7590.

2.5 TOGGLE SWITCHES

- A. Comply with NEMA WD 1, UL 20, and FS W-S-896.
- B. Switches, 120/277 V, 20 A:

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Single Pole:
 - b. Cooper; AH1221.
 - c. Hubbell; 1--1BL1221.
 - d. Leviton; 1221-2.
 - e. Pass & Seymour; CSB20AC1.
 - f. Two Pole:
 - g. Cooper; AH1222.
 - h. Hubbell; HBL1222.
 - i. Leviton; 1222-2.
 - j. Pass & Seymour; CSB20AC2.
 - k. Three way:
 - l. Cooper; AH1223.
 - m. Hubbell; HBL1223.
 - n. Leviton; 1223-2.
 - o. Pass & Seymour; CSB20AC3.
 - p. Four Way:
 - q. Cooper; AH1224.
 - r. Hubbell; HBL1224.
 - s. Leviton•, 1224-2.
 - t. Pass & Seymour; CSB20AC4.

C. Pilot-Light Switches, 20 A:

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Cooper; AH1221PL for 120 and 277 V.
 - b. Hubbell; HBL1201PL for 120 and 277 V.
 - c. Leviton•, 1221 -LHI.
 - d. Pass & Seymour; PS20ACIRPL for 120 V, PS20ACIRPL7 for 277 V.
2. Description: Single pole, with neon-lighted handle, illuminated when switch is "off. "

2.6 WALL PLATES

- A. Single and combination types shall match corresponding wiring devices.
 1. Plate-Securing Screws: Metal with head color to match plate finish.
 2. Material: 0.035-inch- thick, satin-finished, Type 302 stainless steel.
- B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weather resistant, die-cast aluminum with lockable cover.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with NECA 1, including mounting heights listed in that standard unless otherwise indicated
- B. Coordination with Other Trades
 - 1. Protect installed devices and their boxes. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against the outside of boxes
 - 2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint and other material that may contaminate the raceway system, conductors, and cables.
 - 3. Install device in brick or block walls so that the cover plate does not cross a joint unless the joint troweled flush with the face of the wall.
 - 4. Install wiring devices after all wall preparation, including painting, is complete.
- C. Conductors
 - 1. Do not strip insulation from conductors until right before they are spliced or terminated on devices
 - 2. Strip insulation evenly around the conductor using tools designed for this purpose. Avoid scoring or nicking solid wire or cutting strands from stranded wire.
 - 3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails
 - 4. Existing conductors
 - a. Cut back and pigtail, or replace all damaged conductors
 - b. Straighten conductors that remain and remove corrosion and foreign matter.
 - c. Pigtailing existing conductors is permitted, provided the outlet box is large enough.
- D. Device Installation
 - 1. Replace devices that have been in temporary use during construction and that were installed before building finishing operations were complete.
 - 2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
 - 3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment
 - 4. Connect devices to branch circuits using pigtails that are not less than 6 inches in length.
 - 5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, two-thirds to three-fourths of the way around the terminal screw.
 - 6. Use a torque screwdriver when a torque is recommended or required by manufacturer.
 - 7. When conductors large than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
 - 8. Tighten unused terminal screws on devices
 - 9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal to metal contact.

- E. Receptacle orientation:
 - 1. Install ground pin of vertically mounted receptacles down.
- F. Devices Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard devices plates do not fit flush or do not cover rough wall openings.
- G. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single multigang wall plates.

END OF SECTION

APPENDIX 1
GEOTECHNICAL INVESTIGATION

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R E P O R T

**GEOTECHNICAL
INVESTIGATION
PROPOSED HEADWORKS
BUILDING AND GRIT CHAMBER**

**WASTE WATER TREATMENT PLANT
TOWN OF MONTVILLE, CONNECTICUT**

Prepared for
Waste Pollution Control Authority
310 Norwich-New London Turnpike
Uncasville, CT 06382

May 1, 2012

URS

URS Corporation
335 Commerce Drive
Suite 300
Fort Washington, PA 19034-2623
215.367.2500

36938892



May 1, 2012
36938892

Mr. Brian Lynch
Administrator
Waste Pollution Control Authority
310 Norwich-New London Turnpike
Uncasville, CT 06382

**Re: Geotechnical Investigation
Proposed Headworks Building and Grit Chamber
Waste Water Treatment Plant
Town of Montville, Connecticut**

Dear Mr. Lynch:

We are pleased to present herein our report of a geotechnical investigation for the proposed headworks building and grit chamber. This investigation was performed in accordance with the contract dated November 28, 2011, Work Order No. 7.

Soil samples obtained during the investigation will be retained in our laboratory for a period of three months, after which they will be discarded unless other arrangements are made.

We sincerely appreciate the opportunity to be of service to you on this project. If you have any questions regarding the contents of this report, or if we may be of additional service, please do not hesitate to contact us at 215-367-2488.

Very truly yours,

Yongli Min, P.E.
Principal Engineer

Neil Scafonas, E.I.T.
Geotechnical Engineer

cc: John C. Volk, P.E., URS
Richard D. Kruczek, P.E., URS
Evan Andrews, P.E., URS

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The Geotechnical Investigation reported herein was performed at the request of Montville Waste Pollution Control Authority (WPCA) in connection with the proposed design and construction of a headworks building and grit chamber tank at a waste water treatment facility in Montville, Connecticut. The project location is shown on Plate 1, Regional Location Plan.

The purpose of this investigation was to evaluate the geotechnical conditions at the site and to formulate conclusions and recommendations pertaining to the design and construction of the foundations for the proposed structures. Our services consisted of planning the investigation, a subsurface exploration program consisting of test borings, laboratory testing of representative soil samples, engineering analysis of the data obtained, and preparation of this report.

A description of the subsurface exploration program and test boring logs are presented in Appendix A. The geotechnical laboratory testing program is described and the results are summarized in Appendix B. Relevant findings, conclusions, and recommendations derived from this investigation are presented in the following sections.

The proposed structures will be located in the area shown on Plate 2, Boring Location Plan.

The new headworks structure at the treatment plant will be a one-story masonry structure measuring 32 feet by 36 feet in plan. There will be a fine wastewater screen and grit classifier located in the proposed new building, with a combined weight on the order of 15 kips. The structures will handle a peak flow capacity of 14 million gallons per day (MGD). The finish grade will be at El. 38.6 feet.

The partially buried grit chamber tank will be a concrete tank to be located southeast of the proposed building, with an outside diameter of 22 feet and a total height of 24 feet in height. The finish floor elevation at the bottom of the tank will be at El. 20.54 feet, and El. 41.50 feet at the rim. The total capacity of this tank will be approximately 43,000 gallons.

The site is located in the existing waste water treatment facility site in Montville, Connecticut. An existing small building is located immediately north of the proposed building. Another building is located approximately 10 feet east of the proposed grit chamber tank. In the immediate project area, the ground surface is generally flat and supports a cover of grass, with approximately ground surface elevations ranging from El. 36.5 feet to 38.0 feet. Beyond the project area, the terrain slopes downward towards west and north.

The elevations indicated in the report are based on the contour lines and spot elevations shown on a drawing titled Topographical Survey –Wastewater Treatment Facility dated January 2012, provided by URS Corporation AES of Rocky Hill, CT.

SECTION THREE

Site Geology

Montville is located in the Northeast Hills Region of the state, an area of glacially worked hills, valleys and outwash plains. Glacially formed elongated parcels of sand or sand and gravel overlying sand, gravel and or fines, stretch from the northwest to southeast in the northern half of town and close to the southern border with Waterford. Areas of swamp, alluvium and alluvium overlying sands, gravel and/or fines occur in less frequent and smaller parcels throughout Montville.

Bedrock geology underlying the Town of Montville consists mainly of three types: Hope Valley Alaskite Gneiss, a light-pink to gray, medium to coarse-grained granitic gneiss; Plainfield Formation, an interlayered thinly bedded quartzite, mica schist, and dark-gray gneiss; and Potter Hill Granite Gneiss, a light-pink to gray, tan weathering, fine- to medium-grained, well-foliated granitic gneiss. In the Montville area, bedrock formations generally occur in broad, banding formations running west to east.

The subsurface conditions at the site were explored by three test borings with depths ranging from approximately 32 to 42 feet below grade. The locations of test borings are shown on Plate 2, Boring Location Plan. Logs of test borings are presented in Appendix A, together with a description of the drilling and sampling methods. The results of geotechnical laboratory tests are presented in Appendix B. Various subsurface materials encountered at the site, together with the groundwater conditions, are described below.

4.1 TOPSOIL

Topsoil was encountered with a thickness ranging from approximately 3 to 6 inches in all borings.

4.2 STRATUM 1 - SAND

This stratum was encountered below the topsoil in all three borings. All three borings were terminated in this stratum. The material is identified as light brown coarse to fine sand with trace silt and gravel. Standard Penetration Test (SPT) values range from 3 to 75 blows per foot (bpf). Based on the SPT values, the top 6 feet of this stratum is judged to be in a medium dense to dense condition. A loose zone was encountered from approximately 6 feet depth, extending to a depth approximately 13 to 18 feet. Below the loose zone, the material is generally judged to be in a medium dense to dense condition.

Results of six moisture tests indicate a moisture content ranging from 4 to 13 percent.

Corrosivity testing on one combined sample indicates non-detectable concentrations of chlorides, sulfates and sulfides, pH of, and resistivity of 220,000 Ω -cm.

4.3 GROUNDWATER

Groundwater was observed during drilling at a depth of approximately 30.5 to 31.3 feet below ground surface, corresponding to El. 5.8 to El. 6.6 feet. It should be noted that groundwater levels fluctuate due to seasonal, climatic, tidal, and man-made conditions.

5.1 FOUNDATIONS

Based on the test borings, the subsurface generally consists of 6 feet of medium dense to dense sand, followed by approximately 7 to 12 feet of loose sand, overlying in turn by medium dense to dense sand.

Considering the estimated foundation loads and the results of this investigation, shallow based foundations are considered appropriate for support of all proposed structures.

The soils of Stratum 1 would be capable of safely supporting the new building on shallow-based spread and/or continuous wall foundations with a maximum net bearing pressure of 2,000 pounds per square foot (psf). Total settlement is not expected to exceed ½ inch. Differential settlement across the structure is not expected to exceed 3/8 inch. The majority of the estimated settlement is anticipated to occur concurrently with the construction of the proposed building.

5.2 PROTECTION OF EXISTING STRUCTURES

New foundations for the grit chamber tank and headworks building are immediately adjacent to two existing buildings. Care should be exercised to avoid undermining existing foundations during foundation construction. If the excavation is required within the zone of influence and below existing foundations (1H:1V bearing splay), protection of the existing foundation is required.

The construction of the grit chamber will require some 20 feet of excavation. Since the existing building is only about 11 feet east of the new chamber, the excavation is expected to enter the zone of influence of the existing foundations. The existing foundations should be protected during construction of the grit chamber.

The new headworks building will be some 13 feet west of the grit chamber. Therefore, protection of the new foundation for the headworks building is also required. Alternatively, the building foundations may be built following the completion of the grit chamber. In this case, protection of the foundation will not be required. Any methods of protecting the existing foundations should be brought to the Geotechnical Engineer for review and approval.

5.3 GROUNDWATER

Groundwater is not expected to be encountered during construction. However, the contractor should be prepared to remove any accumulation of water due to a “perched” water condition or due to surface water runoff.

Recommendations pertaining to the design and construction of the foundations for the proposed structures are presented below.

6.1 SITE PREPARATION

Site preparation should consist of removing topsoil and vegetation from the area of the proposed construction. Site clearing should extend at least 5 ft beyond the limits of proposed structures. Subsurface utilities in the areas of the proposed structures should either be re-routed or abandoned in place by filling with grout. Loose backfill above and around existing utilities or other unsuitable fill materials should be removed and replaced with structural fill. The subgrade area should then be proof-rolled and compacted on grade utilizing a vibratory drum compactor that imparts a total applied force (static plus dynamic) of at least 500 pounds per lineal inch of drum width.

Any loose or soft materials detected by proof-rolling that cannot be stabilized by additional compaction should be removed to stable material and replaced with structural fill, or otherwise as directed by the Geotechnical Engineer.

6.2 FOUNDATIONS

Design: The proposed tank foundation should consist of shallow foundations supported on the decomposed rock with a maximum net bearing pressure 2,000 psf. The recommended bearing value may be increased by 33 percent for short-term loading such as wind and seismic loads. All spread and continuous footings should have a minimum width of 36 and 18 inches, respectively, regardless of the actual bearing pressures developed. All interior footings in heated areas should be based a minimum of 2 ft below the finished floor. Exterior footings and those interior footings in unheated areas should be based a minimum of 4 ft below adjacent exterior finished grades for frost protection.

A coefficient of friction of 0.30 may be used between the concrete and subgrade soils.

Construction: Foundation excavations should be protected from freezing and the accumulation of ponded water. Concrete should be placed as soon as the excavation is completed. All footing excavation surfaces should be protected until the concrete and backfill are placed. Footing bearing surfaces should be cleaned of all material loosened by the excavation process prior to concrete placement. Should loose or soft materials be encountered which cannot be densified by additional compaction, the loose or soft materials should be removed and replaced with lean concrete or compacted structural fill in accordance with Section 6.4 below.

6.3 SEISMIC CRITERIA

Based on the 2009 International Building Code (IBC 2009), the site soil classification should be D.

6.4 STRUCTURAL FILL

Structural fill will be required for backfilling load bearing areas around the foundations and the new grit chamber tank. Materials to be used for structural fill should be predominantly granular, and free from roots, vegetation, organic material, trash, wood, or other deleterious matters. The

excavated site soils consist of predominantly clean sand. Therefore the on-site soils are considered suitable for use as structural fill. Any imported fill material should be well-graded, predominately granular soils with a maximum particle size of 2 inches, no more than 12 percent finer than the No. 200 Sieve, and having a plasticity index of not greater than 6 percent.

Structural fill should be placed in essentially horizontal lifts with loose thickness of not more than 9 inches. Structural fill should be compacted to an average of no less than 95 percent of the maximum dry density as determined in the laboratory by the Modified Proctor compaction test, ASTM D1557, or not less than 80 percent of the relative density as determined by ASTM D4253/4254 for free-draining fill materials.

6.5 SLAB-ON-GRADE

Slabs-on-grade should be supported on the densified, granular on-site soils or structural fill. Prior to floor slab construction, all subgrades should be thoroughly proof-rolled with a smooth-drum vibratory compactor that imparts a total applied force (static plus dynamic) of at least 500 pounds per lineal inch of drum width. Any soft materials that cannot be densified by additional compaction should be removed and replaced with structural fill. Any materials that were loosened by previous construction activity or weather conditions should be recompacted to the requirements described below in Section 6.4, Structural Fill. A modulus of subgrade reaction, K_b of 100 tons per cubic foot should be used for the densified subgrade.

To preclude floor dampness, a capillary break consisting of a compacted 4-inch thick layer of AASHTO No. 57 stone should be constructed beneath the floor slab. Additionally, a 10-mil polyethylene membrane or similarly rated vapor barrier should be placed over the capillary break after compaction.

6.6 RETAINING WALLS

It is recommended that retaining walls which are restrained from rotational movement be designed to resist "at-rest" lateral earth pressures. The earth pressure should be equivalent to the hydrostatic pressure of a fluid weighing 61 pounds per cubic foot (pcf).

Site retaining walls that are not restrained from rotational movement should be designed for the active earth pressure condition. The active earth pressure should have an equivalent fluid pressure of 42 pcf. Passive pressure resistance would be equal to a fluid pressure of 320 pcf. Weep holes and/or backwall drains should be incorporated in site retaining walls to prevent the build-up of hydrostatic pressures behind the wall.

Pressures caused by surcharge loadings, if present, should also be incorporated in retaining wall designs, approximated as a uniform lateral loading of one-half the expected surcharge pressure on the backfill adjacent to restrained walls and one-third of the surcharge on unrestrained walls. A coefficient of friction of 0.3 should be used for sliding of walls on the natural soil and compacted structural fill.

6.7 GROUNDWATER CONTROL

Groundwater is not expected to be encountered within the depth of anticipated excavation. However, the contractor should be prepared to perform temporary dewatering if perched water is

encountered during excavations. Likewise, foundation excavations should be kept dry until the concrete is poured. No accumulation of water should be allowed on subgrade surfaces.

6.8 EXCAVATION SLOPES

Temporary excavations above the groundwater level should have side slopes not steeper than 1.5H:1V. All excavations should be performed in accordance with current OSHA regulations. Conformance to OSHA requirements is the sole responsibility of the Contractor.

6.9 PROTECTION OF EXISTING STRUCTURES

The existing building foundation east of the proposed new grit chamber should be protected prior to excavating for the new tank. All excavation support should be designed by a professional engineer licensed in Connecticut with demonstrated past experience in designing such structures. Any design related to protection of the existing foundations should be brought to the Geotechnical Engineer for review and approval.

Similarly, it is recommended that the foundations for the new headworks building be constructed following the completion of the new grit chamber tank. Any soils disturbed by the construction of the new tank should be compacted and backfill be placed following the recommendations for structural fill, Section 6.4. Alternatively, the new foundations for the headworks building should be protected from being undermined during the construction of the new grit chamber tank.

6.10 CORROSION POTENTIAL

Comparison of the laboratory results on one sample for pH, resistivity, sulfate and chloride tests with IBC indicates that the concrete in contact with the site soils would have negligible sulfate exposure and that no special type cement would be necessary. The corrosion potential for steel should be evaluated by the structural and utility designers.

6.11 CONSTRUCTION MONITORING

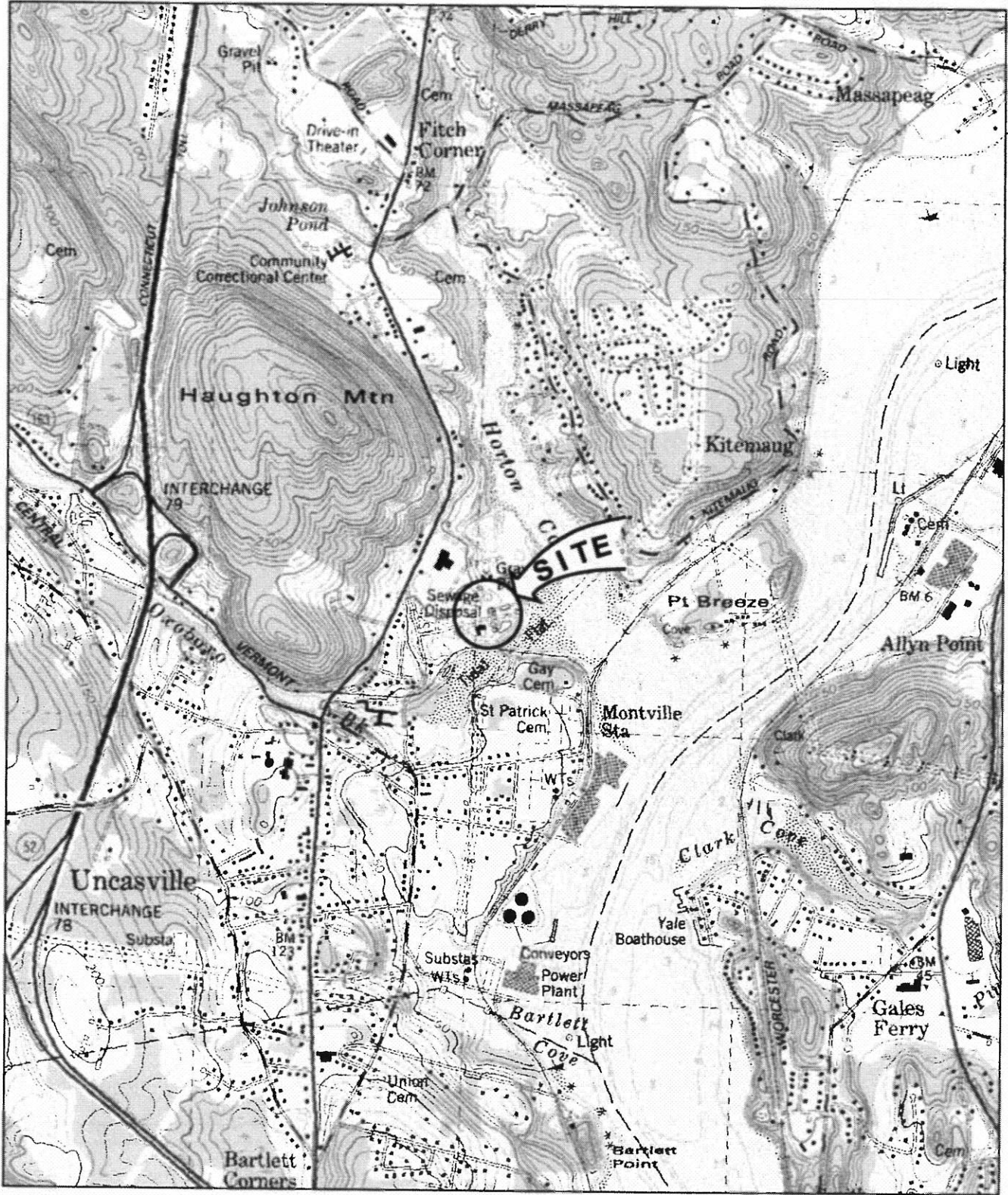
It is recommended that construction monitoring be provided full time during foundation construction by URS. The items that should be observed, monitored include excavation, evaluation of foundations soils, backfill, and/or dewatering.

The services described in this report were provided in accordance with applicable standards of professional care. No warranty or guarantee, expressed or implied, is intended. The conclusions and recommendations are based on the assumptions that the subsurface conditions do not deviate appreciably from those revealed by the test borings drilled during this investigation, and that the loads are similar to those given in the project description. If the structures are moved or loads have changed, URS should be given the opportunity to modify recommendations accordingly. The conclusions and recommendations are also based on competent field engineering, monitoring, and testing during construction. The recommendations presented in this report are solely for the use of our client for the design of this particular project. Any re-use of this document, particularly by third parties, without the express written permission of URS is solely at their own risk.

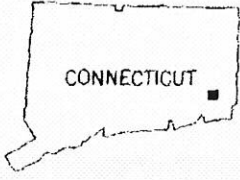




Drawn By & Date/Time: Joseph_Shell Apr 24, 2012 - 3:30pm



Drawing Location & Name: S:\Resources\CADD\Montville\WTF\Fig-01 Regional Location Plan.dwg



QUADRANGLE LOCATION

SCALE: 1 INCH=2000 FEET



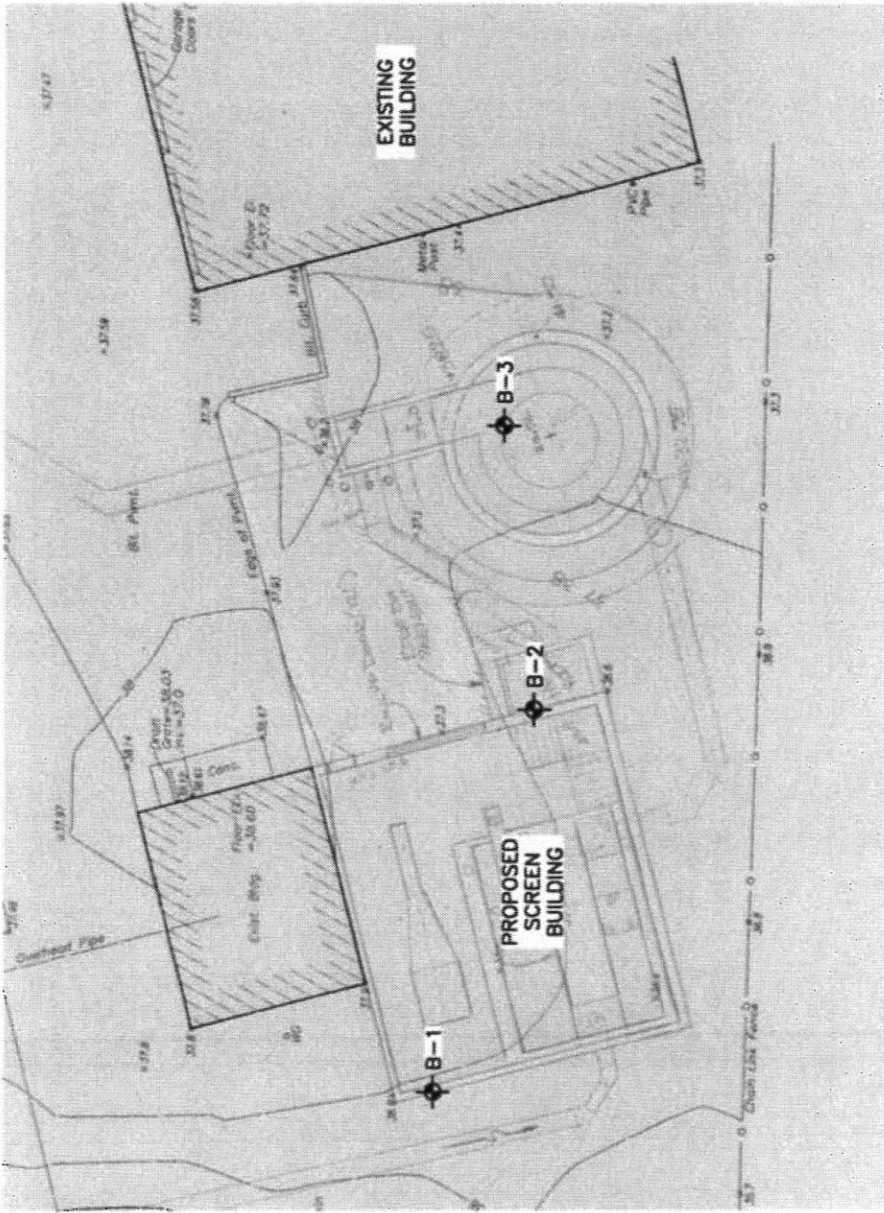
MAP SOURCE:
UNCASVILLE, CONNECTICUT USGS
QUADRANGLE, 1984.

Job: 36938892.00001
Prepared by: JES
Checked by: YM
Date: 04/23/2012

REGIONAL LOCATION PLAN
WASTEWATER TREATMENT FACILITY

MONTVILLE, CONNECTICUT

FIGURE 1



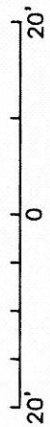
LEGEND

B-1 TEST BORING LOCATION AND ID

NOTE:

BASE DRAWING WAS PROVIDED BY URS CORPORATION AES, ROCKY HILL, CONNECTICUT.

SCALE: 1 INCH = 20 FEET



Job:	36938892.00001
Prepared by:	JES
Checked by:	YM
Date:	04/23/2012

BORING LOCATION PLAN
WASTEWATER TREATMENT FACILITY
 MONTVILLE, CONNECTICUT

FIGURE 2

Appendix A
Subsurface Exploration



Appendix A

Subsurface Exploration

The subsurface exploration for the geotechnical investigation for the proposed grit chamber and headworks building consisted of 3 test borings, as shown on Plate 2, Test Boring Location Plan. The borings were drilled between February 24, 2012 and March 2, 2012 by New England Boring Contractors of Connecticut, Inc. of Glastonbury, CT, under subcontract and full-time technical observation of URS. All test boring locations were laid out in the field by URS Corporation.

All borings were drilled using a Mobile B-51 truck mounted rig and were advanced using hollow stem auger drilling techniques. Samples of subsoils were obtained from the borings for visual classification, identification, and laboratory testing by means of a 2-inch O.D. split-spoon sampler driven up to 24 inches by blows of a 140-pound automatic hammer falling 30 inches (Standard Penetration Test, ASTM D 1586). The number of hammer blows required for a 2-inch O.D. sampler penetration in the interval from 6 to 18 inches, or fraction thereof, is presented on the boring logs as "Sampling Resistance".

A "Key to Soil Symbols and Terms" used in this report is presented on Page A-2, and the logs of the test borings are on Pages A-3 through A-5.



LOG of BORING No. B-1

DATE 3/3/12 SURFACE ELEVATION 37.1 LOCATION See Plate 2

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0				Topsoil (6 inches)	36.6					
26			SS							
24			SS	Medium dense to dense light brown coarse to fine SAND, trace silt, gravel						
5		7	SS							
		3	SS	- loose						
		12	SS							
10		3	SS	- loose						
15		3	SS	- very loose						
20		19	SS	- becoming medium dense						
25		20	SS	- becoming silty sand						
30		17	SS		5.1					
35				Notes: 1. Soil sample was wet at approximately 30 ft depth. 2. Water was observed in the borehole during drilling at approximately 30.5 ft.						
40										

4/27/12 BORLOGR 36938892 MWPCF GPJ

Completion Depth: 32.0 ft. Water Depth: See ft., After _____ hrs.
 Project No.: 36938892 Notes ft., After _____ hrs.
 Project Name: MWPCF _____ ft., After _____ hrs.
 Drilling Method: Hollow Stem Augers _____ ft., After _____ hrs.



LOG of BORING No. B-2

DATE 2/24/12 SURFACE ELEVATION 36.9 LOCATION See Plate 2

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0				Topsoil (3 inches)	36.7					
	24		SS							
	47		SS	Medium dense to dense light brown coarse to fine SAND, trace silt, gravel						
5	16		SS							
	6		SS							
	3		SS	- loose						
10	3		SS	- loose						
15	4		SS	- loose						
20	21		SS							
25	33		SS							
30	18		SS		4.9					
35				Notes: 1. Soil sample was wet at approximately 30 ft depth. 2. Water was observed in the borehole during drilling at approximately 30.8 ft.						
40										

Completion Depth: 32.0 ft. Water Depth: See ft., After _____ hrs.
 Project No.: 36938892 Notes ft., After _____ hrs.
 Project Name: MWPCF _____ ft., After _____ hrs.
 Drilling Method: Hollow Stem Augers _____ ft., After _____ hrs.

LOG of BORING No. B-3

DATE 2/24/12 SURFACE ELEVATION 37.1 LOCATION See Plate 2

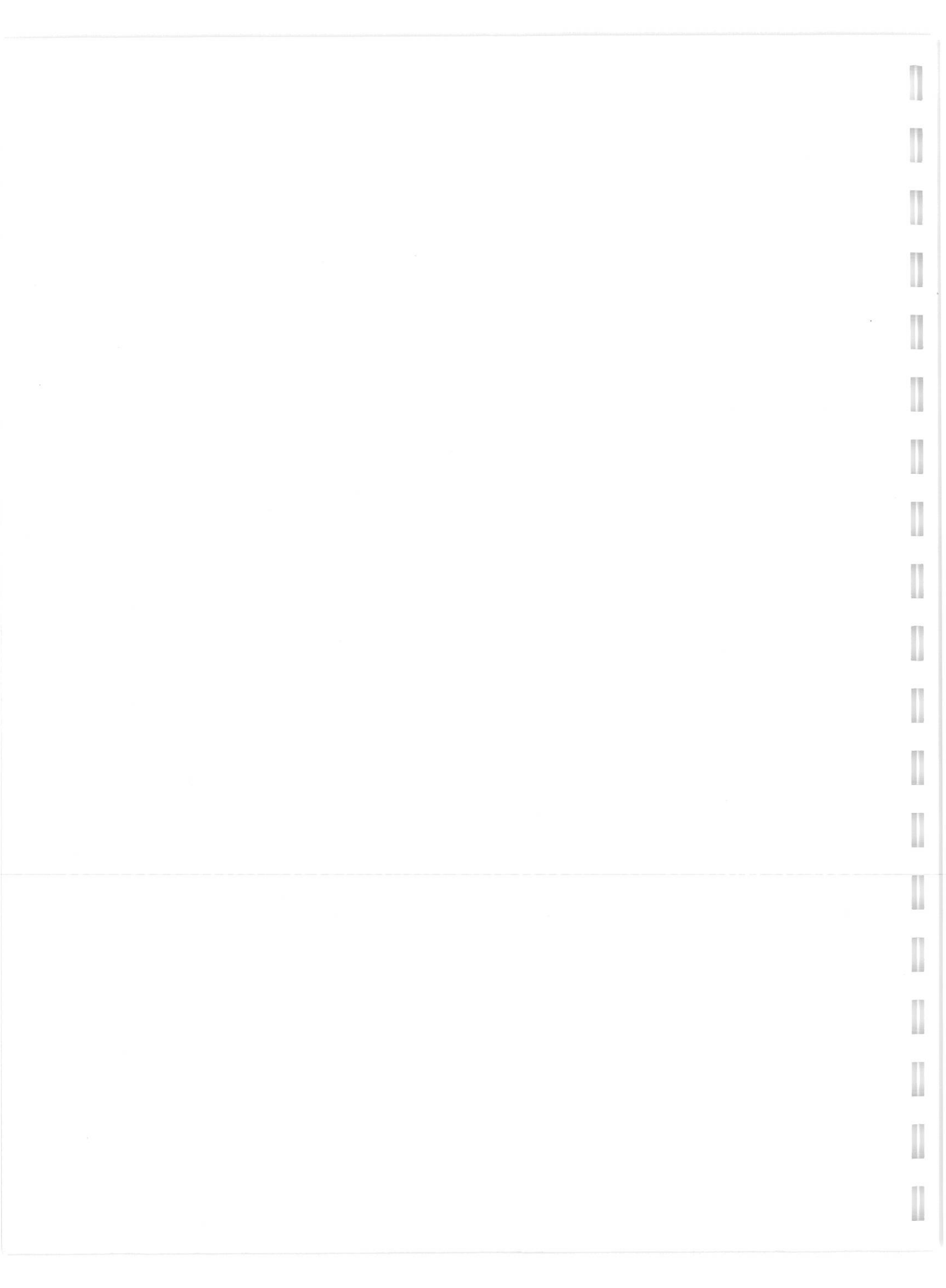
DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0				Topsoil (3 inches)	36.9					
21			SS	Medium dense to dense light brown coarse to fine SAND, trace silt, gravel			3.9			M
25			SS							
5			10	- loose			5.0			M X
			7							
10			4	- loose			3.7			M
			26							
15			26	- loose			8.6			M
			6							
20			6	- becoming silty sand			13.1			M
			35							
25			35	Notes: 1. Soil sample was wet at approximately 30 ft depth. 2. Water was observed in the borehole during drilling at approximately 31.3 ft.			12.5			M
			32							
30			32							
			23							
35			23							
40			75		-4.9					

4/27/12 BOR LOG# 36938892 MWPCF GPJ

Completion Depth: 42.0 ft. Water Depth: See ft., After _____ hrs.
 Project No.: 36938892 Notes ft., After _____ hrs.
 Project Name: MWPCF _____ ft., After _____ hrs.
 Drilling Method: Hollow Stem Augers _____ ft., After _____ hrs.



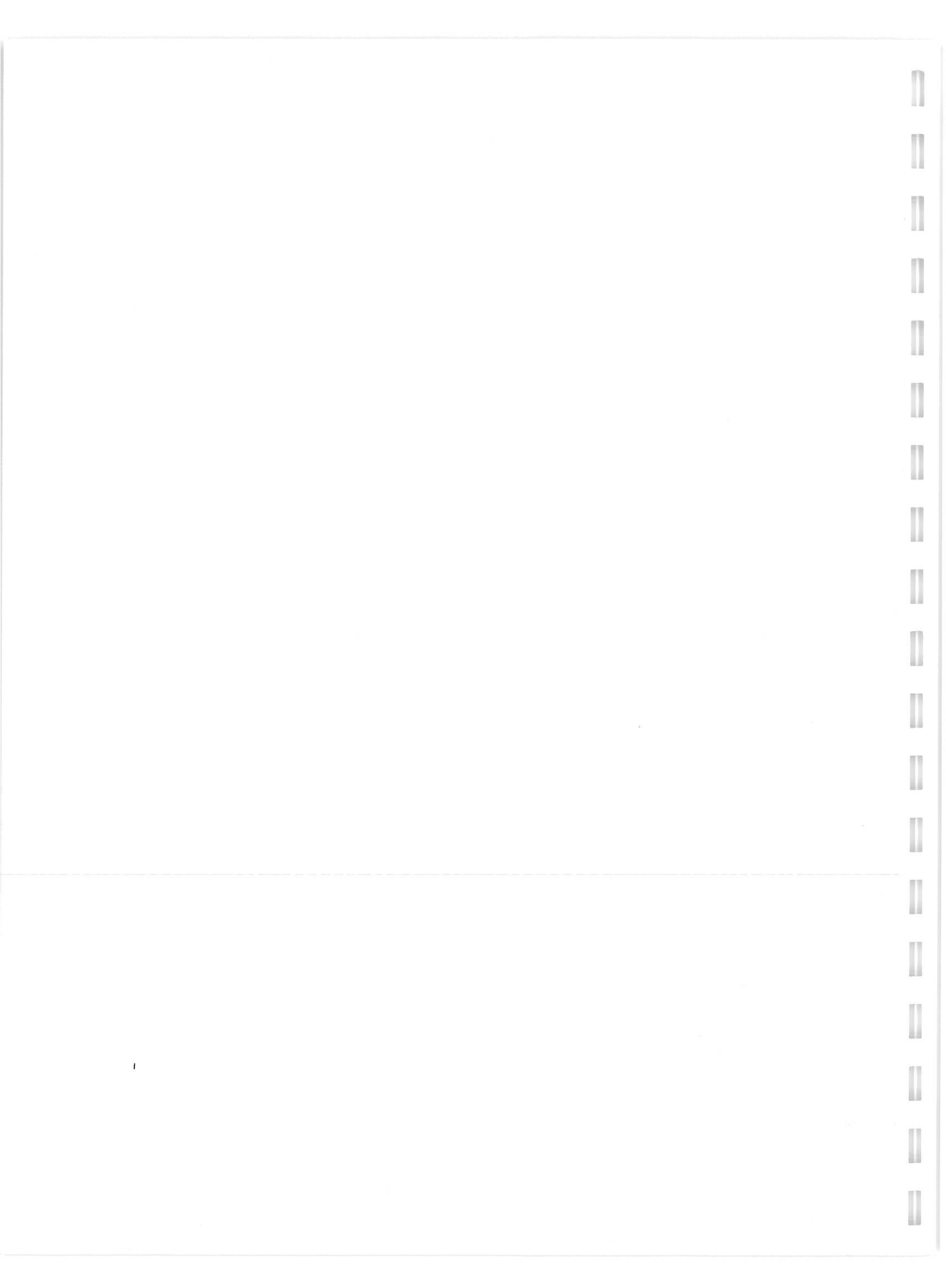
Appendix B
Laboratory Testing



Appendix B Laboratory Testing

Physical property tests were conducted in the laboratory on selected representative soil samples to aid in classification and for correlation with engineering behavior of the soils. These tests included natural water content (ASTM D 2216) and grain-size distribution (ASTM D 422). Corrosivity test suite (resistivity, pH, sulfates, sulfides, and chlorides) are tested on selected samples.

The numerical results are summarized on Page B-2. Grain-size distribution curves are presented on Pages B-3 through B-4.



Project: MWPCF
Project No.: 36938892



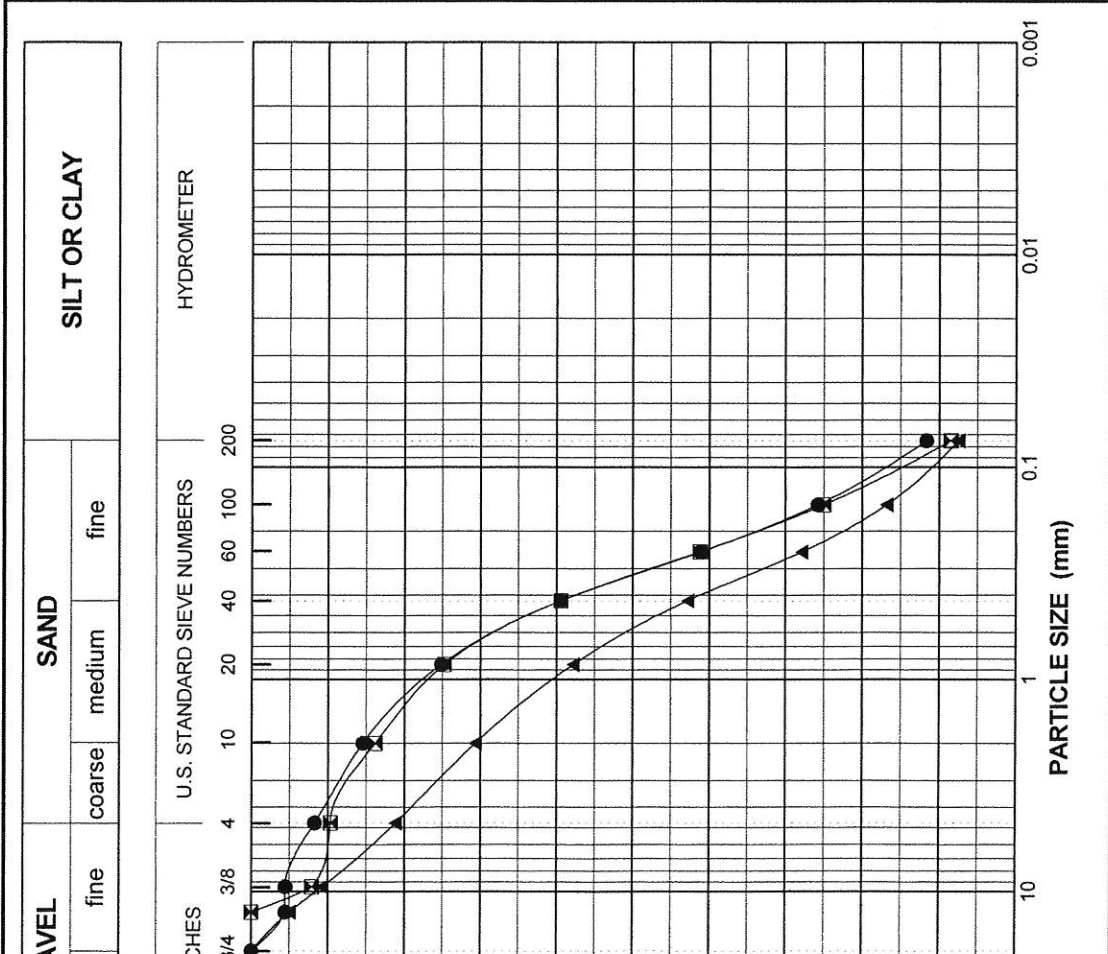
SUMMARY OF LABORATORY TEST RESULTS

Boring and Sample Number	Depth (feet)	Classification	USCS Symbol	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits		Organic Content (%)	Grain Size		Compaction	Consolidation	Analytical Results (ppm)		Triaxial Compression		Resistivity (Ohm-cm)	pH
						Liquid Limit	Plastic Limit		<#200 (%)	<2µ (%)			Chloride	Sulfate	Sulfide	UU		
B-3 S-2	2.0-4.0	Brown POORLY GRADED SAND with SILT	SP-SM	3.9					12									
B-3 S-4 & 5	7.0-12.0	Brown POORLY GRADED SAND with SILT	SP-SM	5.0					8									
B-3 S-4 & 5	7.0-12.0			5.4	117.8									ND	ND	ND	220,000	7.5
B-3 S-6	15.0-17.0	Brown POORLY GRADED SAND with SILT and GRAVEL	SP-SM	3.7					7									
B-3 S-7	20.0-22.0	Brown POORLY GRADED SAND with SILT	SP-SM	8.6					7									
B-3 S-9	30.0-32.0	Brown SILTY SAND	SM	13.1					14									
B-3 S-11	40.0-42.0	Brown POORLY GRADED SAND	SP	12.5					5									

The soil classification and USCS symbols are based partially on visual classification unless both Atterberg limits and grain size analysis tests are performed.

* Refer to Laboratory Test Curves

SYMBOL	●	☒	▲
Boring Sample	B-3	B-3	B-3
Spec	S-2	S-4 & 5	S-6
Depth (ft)	--	--	--
% +3"	2.0-4.0	7.0-12.0	15.0-17.0
% Gravel	0.0	0.0	0.0
% Sand	8.3	10.4	18.9
% Fines	80.1	81.1	73.7
% -2μ	11.6	8.5	7.4
Cc	0.99	0.89	0.82
Cu	6.31	5.46	10.86
LL			
PL			
PI			
USCS	SP-SM	SP-SM	SP-SM
w (%)	3.9	5.0	3.7



PARTICLE SIZE DISTRIBUTION	
MWPCF	
Particle Size (Sieve #)	●
4"	100.0
3"	95.5
1-1/2"	91.7
3/4"	85.5
3/8"	75.1
4	59.4
10	41.1
20	25.7
40	11.6
60	
100	
200	

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

SYMBOL	DESCRIPTION AND REMARKS
●	Brown POORLY GRADED SAND with SILT
☒	Brown POORLY GRADED SAND with SILT
▲	Brown POORLY GRADED SAND with SILT and GRAVEL



Project Number
36938891

March 2012

