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Bid Solicitation – RIDDLE FARM WWTP EQUIPMENT UPGRADES

Worcester County is seeking Bids from qualified Vendors to provide Riddle Farm WWTP Equipment Upgrades in conformity with the requirements contained herein Bid Documents.

Work consists of furnishing and installing equipment for: (1) Replacing MBR membranes and related controls; (2) New internal recycle pumps; (3) New blower for the membrane cleaning tank; (4) Replace existing hoist and crane assembly, plus installation of a new mono-rail beam and hoist assembly; (5) New backwash water pump station and reclaimed water settling tank for the adjacent Riddle Farm Water Treatment Plant [ADD ALTERNATE]; (6) Add variable speed drives for the existing Process Blowers; (7) Replace existing aeration diffusers, (8) Provide temporary mobile hollow fiber treatment system. Work includes associated piping, valves, flow meters and appurtenances. The MBR replacement membranes and mobile hollow fiber treatment system were procured by the County and will be furnished by VEOLIA - ZENON and incorporated in the Bid for all Vendors.

Bid Documents for the above referenced project may be obtained from the Worcester County Commissioner's Office by either e-mailing the Procurement Officer, Nicholas Rice, at nrice@co.worcester.md.us or by calling 410-632-1194 during normal business hours, or via the County's Bids page on the County's [website](#). Vendors are responsible for checking this website for addenda prior to submitting their bids. Worcester County is not responsible for the content of any Bid Document received through any third party bid service. It is the sole responsibility of the vendor to ensure the completeness and accuracy of their Completed Bid Documents.

The last day for questions will be Monday, May 6, 2024, at 2:00 p.m. A pre-bid meeting will be held on Tuesday, April 30, 2024, at 10:00 a.m. at the project site located at 11401 Grays Corner, Berlin, MD 21811. Sealed Bid Documents are due no later than Monday, May 13, 2024, at 2:30 p.m. and will be opened and read aloud in the Office of the County Commissioners, Worcester County Government Center – Room 1103, One West Market Street, Snow Hill, Maryland 21863.

Late Bid Documents will not be accepted.

Minority vendors are encouraged to compete for the award of the solicitation.

Nicholas W. Rice, CPPO, CPPB, NIGP-CPP
Procurement Officer
Worcester County, Maryland



PROJECT MANUAL
EQUIPMENT UPGRADES
RIDDLE FARM WASTEWATER TREATMENT PLANT
WORCESTER COUNTY, MARYLAND



AUGUST 2023

GMB FILE NO. 220047

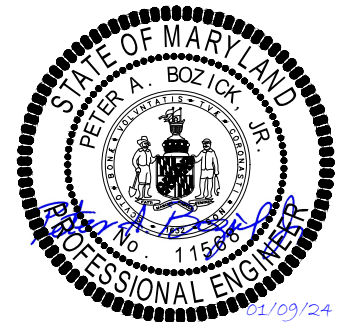
GMB

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SALISBURY/BALTIMORE/SEAFORD



RIDDLE FARM WASTEWATER TREATMENT PLANT EQUIPMENT UPGRADES

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DIVISION 00 – BIDDING AND CONTRACT REQUIREMENTS

SECTION 00200 - INSTRUCTIONS TO BIDDERS

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ARTICLE 1—DEFINED TERMS

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

ARTICLE 2—BIDDING DOCUMENTS

- 2.01 Bidder shall obtain a complete set of Bidding Requirements and proposed Contract Documents (together, the Bidding Documents). See the Agreement for a list of the Contract Documents. It is Bidder's responsibility to determine that it is using a complete set of documents in the preparation of a Bid. Bidder assumes sole responsibility for errors or misinterpretations resulting from the use of incomplete documents, by Bidder itself or by its prospective Subcontractors and Suppliers.
- 2.02 Bidding Documents are made available for the sole purpose of obtaining Bids for completion of the Project and permission to download or distribution of the Bidding Documents does not confer a license or grant permission or authorization for any other use. Authorization to download documents, or other distribution, includes the right for plan holders to print documents solely for their use, and the use of their prospective Subcontractors and Suppliers, provided the plan holder pays all costs associated with printing or reproduction. Printed documents may not be re-sold under any circumstances.
- 2.03 Bidder may register as a plan holder and obtain complete sets of Bidding Documents, in the number and format stated in the Advertisement or invitation to bid, from the Issuing Office. Bidders may rely upon sets of Bidding Documents obtained from the Issuing Office are complete, unless an omission is blatant. Registered plan holders will receive Addenda issued by Owner.
- 2.04 *Electronic Documents*
- A. When the Bidding Requirements indicate that electronic (digital) copies of the Bidding Documents are available, such documents will be made available to the Bidders as Electronic Documents in the manner specified.
1. Bidding Documents will be provided in Adobe PDF (Portable Document Format) (.pdf). It is the intent of the Engineer and Owner that such Electronic Documents are to be exactly representative of the paper copies of the documents. However, because the Owner and Engineer cannot totally control the transmission and receipt of Electronic Documents nor the Contractor's means of reproduction of such documents, the Owner and Engineer cannot and do not guarantee that Electronic Documents and reproductions prepared from those versions are identical in every manner to the paper copies.
- B. Unless otherwise stated in the Bidding Documents, the Bidder may use and rely upon complete sets of Electronic Documents of the Bidding Documents, described in Paragraph 2.06.A above. However, Bidder assumes all risks associated with differences arising from transmission/receipt of Electronic Documents versions of Bidding Documents and reproductions prepared from those versions and, further, assumes all risks, costs, and

responsibility associated with use of the Electronic Documents versions to derive information that is not explicitly contained in printed paper versions of the documents, and for Bidder's reliance upon such derived information.

ARTICLE 3—QUALIFICATIONS OF BIDDERS

- 3.01 Bidder is to submit C-451 "Qualifications Statement" with its Bid to demonstrate Bidder's qualifications to perform the Work.
- 3.02 A Bidder's failure to submit required qualification information within the times indicated may disqualify Bidder from receiving an award of the Contract.
- 3.03 No requirement in this Article 3 to submit information will prejudice the right of Owner to seek additional pertinent information regarding Bidder's qualifications.

ARTICLE 4—PRE-BID CONFERENCE

- 4.01 A non-mandatory pre-bid conference will be held at the time and location indicated in the Advertisement or invitation to bid. Representatives of Owner and Engineer will be present to discuss the Project. Bidders are encouraged to attend and participate in the conference; however, attendance at this conference is not required to submit a Bid.
- 4.02 Information presented at the pre-Bid conference does not alter the Contract Documents. Owner will issue Addenda to make any changes to the Contract Documents that result from discussions at the pre-Bid conference. Information presented, and statements made at the pre-bid conference will not be binding or legally effective unless incorporated in an Addendum.

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

5.01 *Site and Other Areas*

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

5.02 *Existing Site Conditions*

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

- 1. The Supplementary Conditions identify the following regarding existing conditions at the Site:
 - a. Those reports of explorations and tests of subsurface conditions at or adjacent to the Site that contain Technical Data.
 - b. Those drawings known to Owner of existing physical conditions at or adjacent to the Site, including those drawings depicting existing surface or subsurface structures at or adjacent to the Site (except Underground Facilities), that contain Technical Data.

- c. Reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site.
 - d. Technical Data contained in such reports and drawings.
2. Owner will make copies of reports and drawings referenced above available to any Bidder on request. These reports and drawings are not part of the Contract Documents, but the Technical Data contained therein upon whose accuracy Bidder is entitled to rely, as provided in the General Conditions, has been identified and established in the Supplementary Conditions. Bidder is responsible for any interpretation or conclusion Bidder draws from any Technical Data or any other data, interpretations, opinions, or information contained in such reports or shown or indicated in such drawings.
 3. If the Supplementary Conditions do not identify Technical Data, the default definition of Technical Data set forth in Article 1 of the General Conditions will apply.
- B. *Underground Facilities:* Underground Facilities are shown or indicated on the Drawings, pursuant to Paragraph 5.05 of the General Conditions, and not in the drawings referred to in Paragraph 5.02.A of these Instructions to Bidders. Information and data regarding the presence or location of Underground Facilities are not intended to be categorized, identified, or defined as Technical Data.

5.03 *Site Visit and Testing by Bidders*

- A. Bidder is required to visit the Site and conduct a thorough visual examination of the Site and adjacent areas. During the visit, the Bidder must not disturb any ongoing operations at the Site.
- B. A Site visit is usually scheduled following the pre-bid conference.
- C. Bidders visiting the Site are required to arrange their own transportation to the Site.
- D. All access to the Site other than during a regularly scheduled Site visit must be coordinated through the Owner. Bidder must conduct the required Site visit during normal working hours.
- E. Bidder is not required to conduct any subsurface testing, or exhaustive investigations of Site conditions. However, Bidder is responsible for making reasonable inspections of Site conditions in accordance with Article 6.
- F. On request, and to the extent Owner has control over the Site, and schedule permitting, the Owner will provide Bidder general access to the Site to conduct such additional examinations, investigations, explorations, tests, and studies as Bidder deems necessary for preparing and submitting a successful Bid. Owner will not have any obligation to grant such access if doing so is not practical because of existing operations, security or safety concerns, or restraints on Owner's authority regarding the Site. Bidder is responsible for establishing access needed to reach specific selected test sites.
- G. Bidder must comply with all applicable Laws and Regulations regarding excavation and location of utilities, obtain all permits, and comply with all terms and conditions established by Owner or by property owners or other entities controlling the Site with respect to schedule, access, existing operations, security, liability insurance, and applicable safety programs.

- H. Bidder must fill all holes and clean up and restore the Site to its former condition upon completion of such explorations, investigations, tests, and studies.

5.04 *Owner's Safety Program*

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

5.05 *Other Work at the Site*

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

ARTICLE 6—BIDDER'S REPRESENTATIONS AND CERTIFICATIONS

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

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

ARTICLE 7—INTERPRETATIONS AND ADDENDA

- 7.01 Owner on its own initiative may issue Addenda to clarify, correct, supplement, or change the Bidding Documents. All Bidders shall acknowledge receipt of all Addenda on the Bid Form. Failure to do so may result in Bid rejection.
- 7.02 Bidder shall submit all questions about the meaning or intent of the Bidding Documents to Engineer in writing.
- 7.03 Interpretations or clarifications considered necessary by Engineer in response to such questions will be issued by Addenda delivered to all registered plan holders. Questions received less than seven days prior to the date for opening of Bids may not be answered.
- 7.04 Only responses set forth in an Addendum will be binding. Oral and other interpretations or clarifications will be without legal effect. Responses to questions are not part of the Contract Documents unless set forth in an Addendum that expressly modifies or supplements the Contract Documents.

ARTICLE 8—BID SECURITY

- 8.01 A Bid must be accompanied by Bid security made payable to Owner in an amount of 5 percent of Bidder's maximum Bid price (determined by adding the base bid and all alternates) and in the form of a Bid bond issued by a surety meeting the requirements of Paragraph 6.01 of the

General Conditions. Such Bid bond will be issued in the form included in the Bidding Documents. Bid security must be at least 5% of the Bidder's maximum Bid price. The Bid Bond included in the Bidding Documents must be completed and submitted with the Bid. All Bids without the properly executed Bid Bond in the format as required herein may be rejected.

- 8.02 The Bid security of the apparent Successful Bidder will be retained until Owner awards the contract to such Bidder, and such Bidder has executed the Contract, furnished the required Contract security, and met the other conditions of the Notice of Award, whereupon the Bid security will be released. If the Successful Bidder fails to execute and deliver the Contract and furnish the required Contract security within 15 days after the Notice of Award, Owner may consider Bidder to be in default, annul the Notice of Award, and the Bid security of that Bidder will be forfeited, in whole in the case of a penal sum bid bond, and to the extent of Owner's damages in the case of a damages-form bond. Such forfeiture will be Owner's exclusive remedy if Bidder defaults. The next low Bidder in order of Bid price shall then be considered the lowest responsive Bidder and the Contract will be awarded to him. Should this Bidder default, the next low Bidder shall be considered and so on. In each case, a defaulting Bidder forfeits the Bid security.
- 8.03 The Bid security of other Bidders that Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of 7 days after the Effective Date of the Contract or 61 days after the Bid opening, whereupon Bid security furnished by such Bidders will be released.

ARTICLE 9—CONTRACT TIMES

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

ARTICLE 10—SUBSTITUTE AND "OR EQUAL" ITEMS

- 10.01 The Contract for the Work, as awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents, and those "or-equal" or substitute or materials and equipment subsequently approved by Engineer prior to the submittal of Bids and identified by Addendum. No item of material or equipment will be considered by Engineer as an "or-equal" or substitute unless written request for approval has been submitted by Bidder and has been received by Engineer within 10 days of the issuance of the Advertisement for Bids or invitation to Bidders. Each such request must comply with the requirements of Paragraphs 7.05 and 7.06 of the General Conditions, and the review of the request will be governed by the principles in those paragraphs. The burden of proof of the merit of the proposed item is upon Bidder. Engineer's decision of approval or disapproval of a proposed item will be final. If Engineer approves any such proposed item, such approval will be set forth in an Addendum issued to all registered Bidders. Bidders cannot rely upon approvals made in any other manner. Substitutes and "or-equal" materials and equipment may be proposed by Contractor in

accordance with Paragraphs 7.05 and 7.06 of the General Conditions after the Effective Date of the Contract.

- 10.02 All prices that Bidder sets forth in its Bid will be based on the presumption that the Contractor will furnish the materials and equipment specified or described in the Bidding Documents, as supplemented by Addenda. Any assumptions regarding the possibility of post-Bid approvals of “or-equal” or substitution requests are made at Bidder’s sole risk.

ARTICLE 11—SUBCONTRACTORS, SUPPLIERS, AND OTHERS

- 11.01 Bidders must submit to Owner a list of the subcontractors proposed for each type of work identified in the Bid Form. Subcontractors shall be duly licensed in the State of Maryland.
- 11.02 If requested by Owner, such list must be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each such Subcontractor or Supplier. If Owner or Engineer, after due investigation, has reasonable objection to any proposed Subcontractor or Supplier, Owner may, before the Notice of Award is given, request apparent Successful Bidder to submit an acceptable substitute, in which case apparent Successful Bidder will submit a substitute, Bidder’s Bid price will be increased (or decreased) by the difference in cost occasioned by such substitution, and Owner may consider such price adjustment in evaluating Bids and making the Contract award.
- 11.03 If apparent Successful Bidder declines to make any such substitution, Owner may award the Contract to the next lowest Bidder that proposes to use acceptable Subcontractors and Suppliers. Declining to make requested substitutions will constitute grounds for forfeiture of the Bid security of any Bidder. Any Subcontractor or Supplier, so listed and against which Owner or Engineer makes no written objection prior to the giving of the Notice of Award will be deemed acceptable to Owner and Engineer subject to subsequent revocation of such acceptance as provided in Paragraph 7.07 of the General Conditions.
- 11.04 The Contractor shall not award work to Subcontractor(s) in excess of the limits stated in SC 7.07A.
- 11.05 Contractor shall provide Owner within thirty (30) days of signing the Agreement, copies of all business or occupational licenses required of Subcontractors that will perform work on the Contract. If a Subcontractor is hired or contracted more than twenty (20) days after Contractor signed the Agreement, the occupational or business licenses of the Subcontractors shall be provided to Owner within ten (10) days of being contracted or hired. These timeframes do not preclude Owner from making an earlier request for a copy of the business or occupational licenses of the Subcontractors in performing an investigation of a Subcontractor under this Article.

ARTICLE 12—PREPARATION OF BID

- 12.01 The Bid Form is included with the Bidding Documents.
- A. All blanks on the Bid Form must be completed in ink or typewritten and the Bid Form signed in ink. Erasures or alterations must be initialed in ink by the person signing the Bid Form. A Bid price must be indicated for each section, Bid item, alternate, adjustment unit price item, and unit price item listed therein. Failure to comply may be cause for rejection. No allowances, segregated Bids or assignments will be considered. State all amounts in numerical figures. A Bidder shall make no additional stipulations on the Bid Form to qualify

his Bid by attachments or any other matter. Stipulations or qualifications will be subject to Bid rejection.

- B. If the Bid Form expressly indicates that submitting pricing on a specific alternate item is optional, and Bidder elects to not furnish pricing for such optional alternate item, then Bidder may enter the words "No Bid" or "Not Applicable."
- 12.02 If Bidder has obtained the Bidding Documents as Electronic Documents, then Bidder shall prepare its Bid on a paper copy of the Bid Form printed from the Electronic Documents version of the Bidding Documents. The printed copy of the Bid Form must be clearly legible, printed on 8½ inch by 11-inch paper and as closely identical in appearance to the Electronic Document version of the Bid Form as may be practical. The Owner reserves the right to accept Bid Forms which nominally vary in appearance from the original paper version of the Bid Form, providing that all required information and submittals are included with the Bid.
 - 12.03 A Bid by a corporation must be executed in the corporate name by a corporate officer (whose title must appear under the signature), accompanied by evidence of authority to sign. The corporate address and state of incorporation must be shown.
 - 12.04 A Bid by a partnership must be executed in the partnership name and signed by a partner (whose title must appear under the signature), accompanied by evidence of authority to sign. The official address of the partnership must be shown.
 - 12.05 A Bid by a limited liability company must be executed in the name of the firm by a member or other authorized person and accompanied by evidence of authority to sign. The state of formation of the firm and the official address of the firm must be shown.
 - 12.06 A Bid by an individual must show the Bidder's name and official address.
 - 12.07 A Bid by a joint venture must be executed by an authorized representative of each joint venture in the manner indicated on the Bid Form. The joint venture must have been formally established prior to submittal of a Bid, and the official address of the joint venture must be shown.
 - 12.08 All names must be printed in ink below the signatures.
 - 12.09 The Bid must contain an acknowledgment of receipt of all Addenda, the numbers of which must be filled in on the Bid Form.
 - 12.10 Postal and e-mail addresses and telephone number for communications regarding the Bid must be shown.
 - 12.11 The Bid must contain evidence of Bidder's authority to do business in the state where the Project is located, or Bidder must certify in writing that it will obtain such authority within the time for acceptance of Bids and attach such certification to the Bid.
 - 12.12 If Bidder is required to be licensed to submit a Bid or perform the Work in the state where the Project is located, the Bid must contain evidence of Bidder's licensure, or Bidder must certify in writing that it will obtain such licensure within the time for acceptance of Bids and attach such evidence of certification to the Bid. Bidder's state contractor license number, if any, must also be shown on the Bid Form.

ARTICLE 13—BASIS OF BID

13.01 *Lump Sum*

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

13.02 *Base Bid with Alternates*

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

13.03 *Unit Price*

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

13.04 *Allowances*

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

ARTICLE 14—SUBMITTAL OF BID

14.01 Within each copy of the Bidding Documents, the Bid Form is to be completed and submitted with the Bid security and the other documents required to be submitted under the terms of Article 2 of the Bid Form.

14.02 A Bid must be received no later than the date and time prescribed and at the place indicated in the Advertisement or invitation to bid and must be sealed in a plainly marked package with the Project title, the Bid Opening date and time, and the Bidder's name, address, and Maryland license number. Each Bid shall be completed on the forms provided. If a Bid is sent by mail or other delivery system, the sealed envelope containing the Bid must be enclosed in a separate package plainly marked on the outside with the notation “BID ENCLOSED.” A mailed Bid must be addressed to the location designated in the Advertisement.

14.03 Bids received after the date and time prescribed for the opening of bids, or not submitted at the correct location or in the designated manner, will not be accepted and will be returned to

the Bidder unopened. Oral, telegraphic, electronic, or telephonic Bids are invalid and will not receive consideration.

ARTICLE 15—MODIFICATION AND WITHDRAWAL OF BID

- 15.01 An unopened Bid may be withdrawn by an appropriate document duly executed in the same manner that a Bid must be executed and delivered to the place where Bids are to be submitted prior to the date and time for the opening of Bids. Upon receipt of such notice, the unopened Bid will be returned to the Bidder.
- 15.02 If a Bidder wishes to modify its Bid prior to Bid opening, Bidder must withdraw its initial Bid in the manner specified in Paragraph 15.01 and submit a new Bid prior to the date and time for the opening of Bids.
- 15.03 Bids may not be withdrawn within one hundred (100) days after the Bid Opening.

ARTICLE 16—OPENING OF BIDS

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

ARTICLE 17—BIDS TO REMAIN SUBJECT TO ACCEPTANCE

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

ARTICLE 18—EVALUATION OF BIDS AND AWARD OF CONTRACT

- 18.01 Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. Owner also reserves the right to waive all minor Bid informalities or minor defects.
- 18.02 Owner will reject the Bid of any Bidder that Owner finds, after reasonable inquiry and evaluation, to not be responsible.
- 18.03 If Bidder purports to add terms or conditions to its Bid, takes exception to any provision of the Bidding Documents, or attempts to alter the contents of the Contract Documents for purposes of the Bid, whether in the Bid itself or in a separate communication to Owner or Engineer, then Owner will reject the Bid as nonresponsive.
- 18.04 If Owner awards the contract for the Work, such award will be to the responsible Bidder submitting the lowest responsive Bid.
- 18.05 *Evaluation of Bids*
 - A. In evaluating Bids, Owner will consider whether the Bids comply with the prescribed requirements, and such alternates, unit prices, and other data, as may be requested in the Bid Form or prior to the Notice of Award.

- B. For the determination of the apparent low Bidder when unit price bids are submitted, Bids will be compared on the basis of the total of the products of the estimated quantity of each item and unit price Bid for that item, together with any lump sum items.
- 18.06 In evaluating whether a Bidder is responsible, Owner will consider the qualifications of the Bidder and may consider the qualifications and experience of Subcontractors and Suppliers proposed for those portions of the Work for which the identity of Subcontractors and Suppliers must be submitted as provided in the Bidding Documents.
- 18.07 Owner may conduct such investigations as Owner deems necessary to establish the responsibility, qualifications, and financial ability of Bidders and any proposed Subcontractors or Suppliers.
- 18.08 If a Bidder wants to protest a bid award, he/she must submit a formal letter to the Finance Director within fifteen (15) days of contract award.

ARTICLE 19—BONDS AND INSURANCE

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

ARTICLE 20—SIGNING OF AGREEMENT

- 20.01 When Owner issues a Notice of Award to the Successful Bidder, it will be accompanied by the unexecuted counterparts of the Agreement along with the other Contract Documents as identified in the Agreement. Within ~~15~~ 20 days thereafter, Successful Bidder must execute and deliver the required number of counterparts of the Agreement and any bonds and insurance documentation required to be delivered by the Contract Documents to Owner. Within 10 days thereafter, Owner will deliver one fully executed counterpart of the Agreement to Successful Bidder, together with printed and electronic copies of the Contract Documents as stated in Paragraph 2.02 of the General Conditions.

ARTICLE 21—SALES AND USE TAXES

- 21.01 The Contractor shall be responsible for the payment of any state taxes, if any, assessed in relation to the work, including but not limited to gross receipt taxes. Taxes must not be included in the Bid. Refer to Paragraph SC-7.10 of the Supplementary Conditions for additional information.

ARTICLE 22—CONTRACTS TO BE ASSIGNED

- 22.01 Bidder's attention is directed to the provisions of Paragraph 10.02 of the Agreement which provide for the assignment of the EQUIPMENT SUPPLY AND SERVICES CONTRACT for furnishing Goods and Special Services covered by these Bidding Documents to a construction contractor designated by the OWNER to construct the MEMBRANE BIO-REACTOR (MBR). The application of the terms and conditions of the Contract Documents after the Contract has been assigned to the

construction contractor should be considered by Bidder. Timing of the assignment is set forth in the Agreement. Forms documenting the assignment of the Contract and for the agreement of the Seller's surety to such assignment are included as attachments to the Agreement.

- A. Owner as "buyer" has executed a contract with Zenon Environmental Corporation d/b/a Veolia as "seller" for the procurement of goods and special services for the Membrane Bio-Reactor (MBR) System. The materials and equipment provided for in the procurement contract are to be furnished and delivered to the Riddle Farm WWTP for installation by Contractor. The said procurement contract will be assigned by Owner to Contractor as set forth in the Agreement. Contractor will accept the assignment and assume responsibility for the "seller", who will become a Subcontractor to Contractor.

DIVISION 00 – BIDDING AND CONTRACT REQUIREMENTS

SECTION 00320

- GEOTECHNICAL DATA

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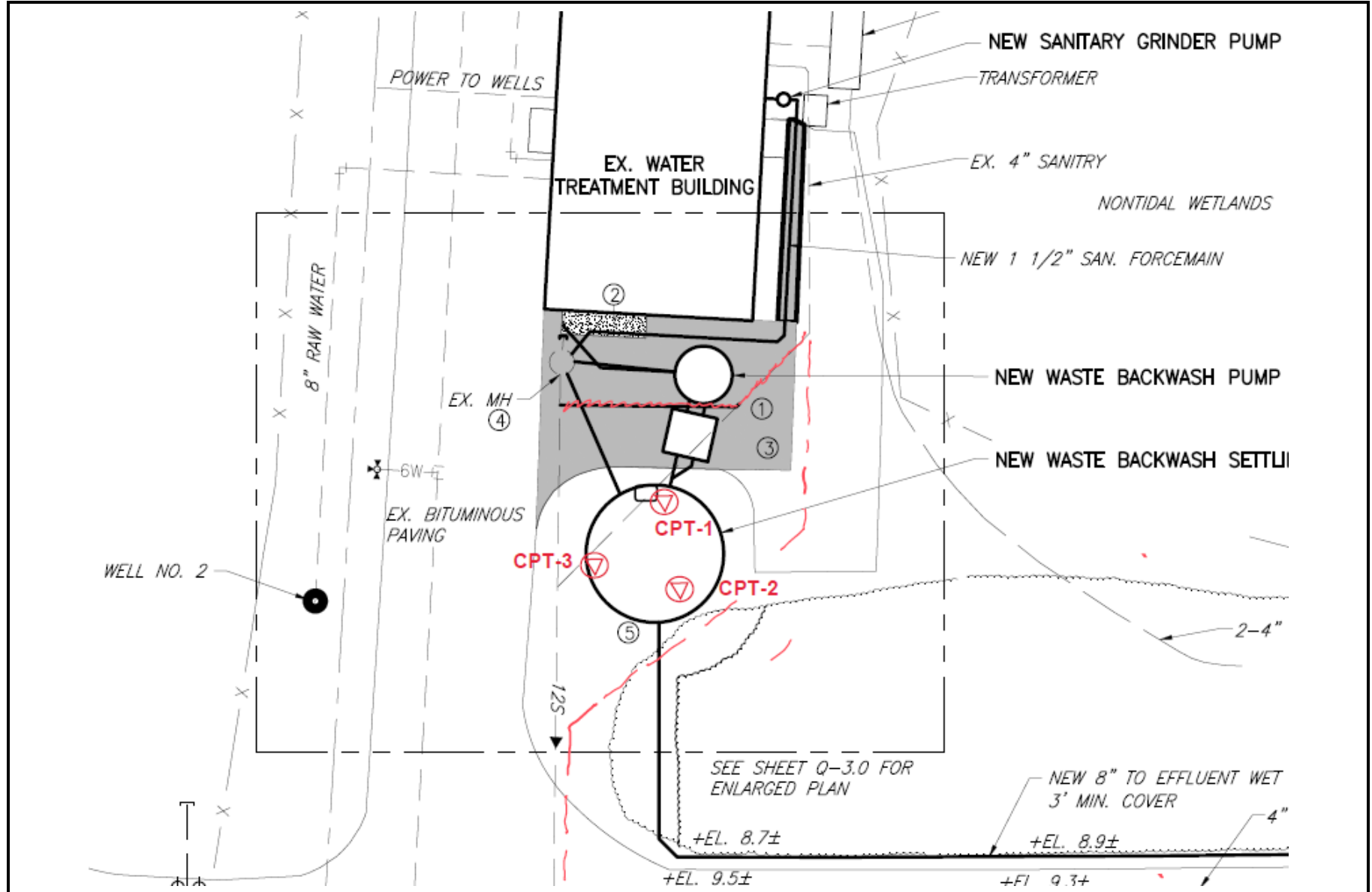


FIGURE 1A: TESTING LOCATION MAP
Riddle Farm WWTTP
Berlin, Maryland

Date: February 1, 2024
Scale: NTS
SGI Project Number: 24002
00320 - 4

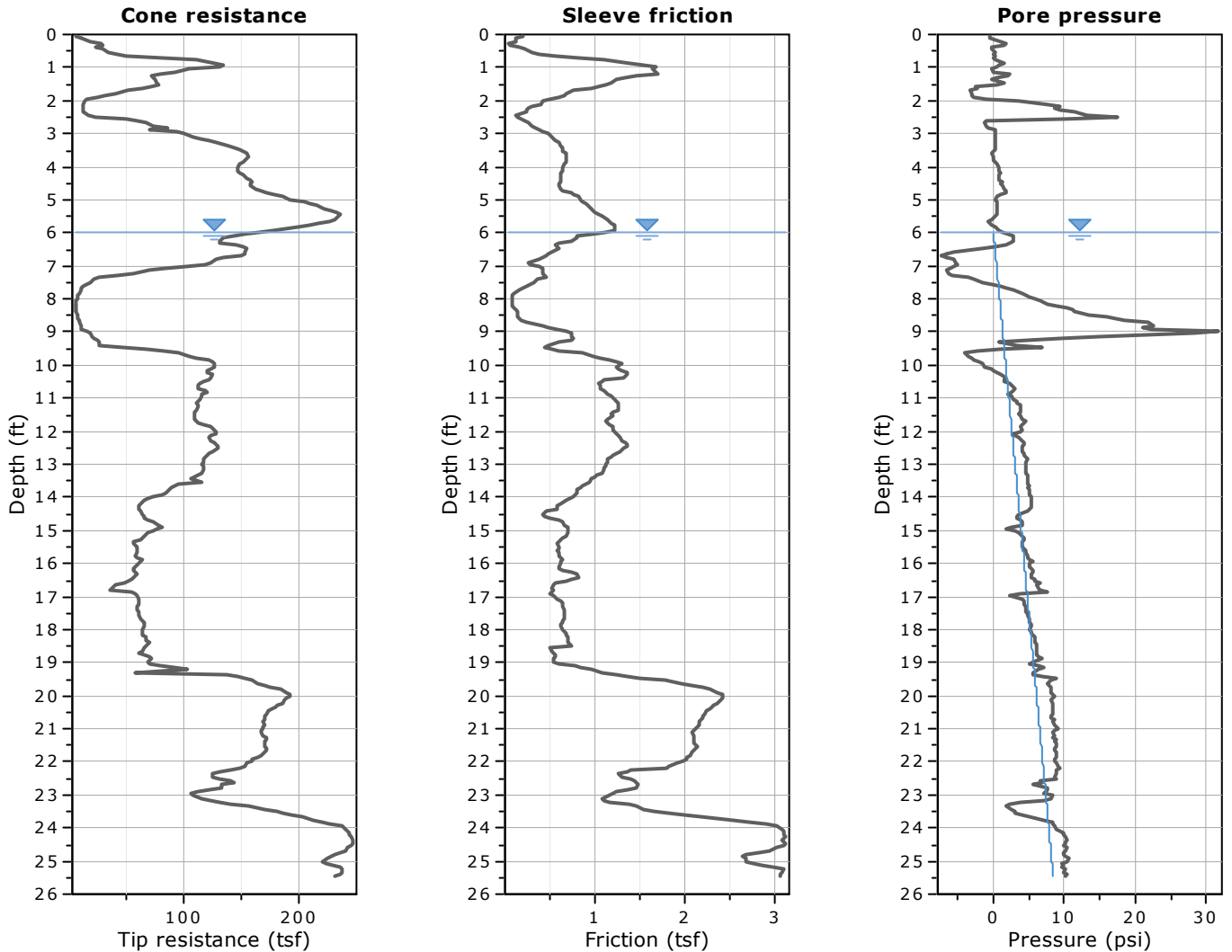


CPT Logs and Interpretations



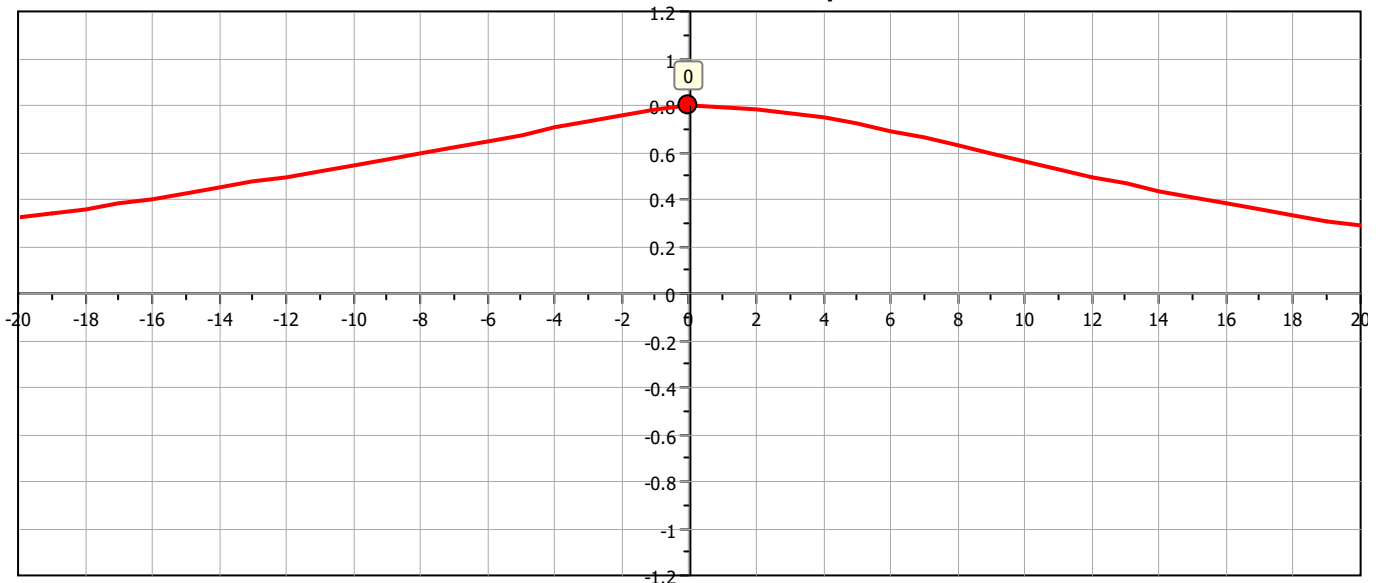
Project: Riddle Farm Waste Water Treatment Plant

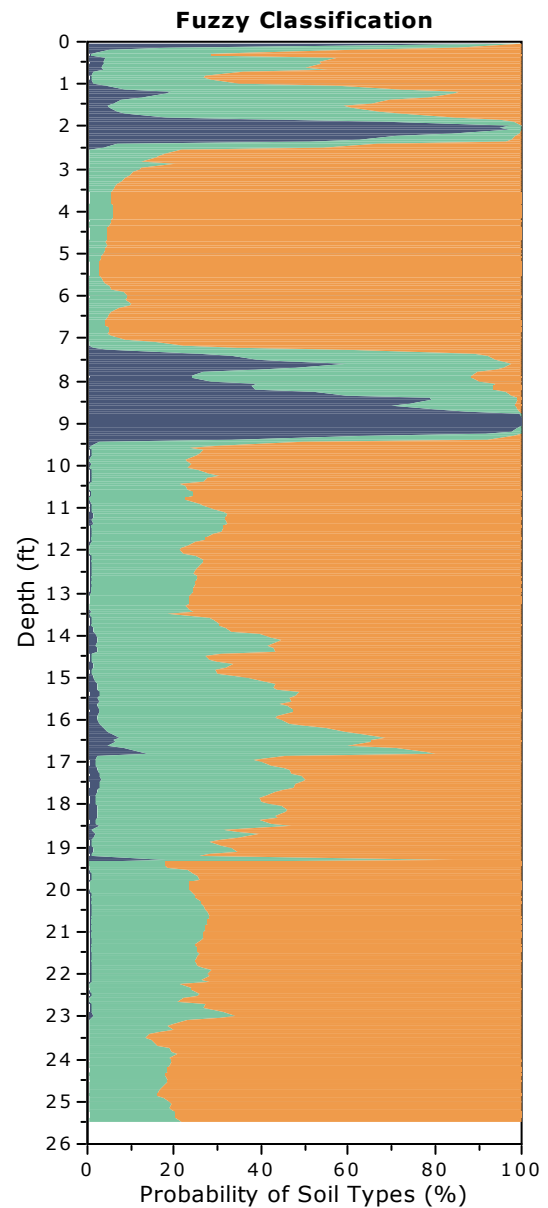
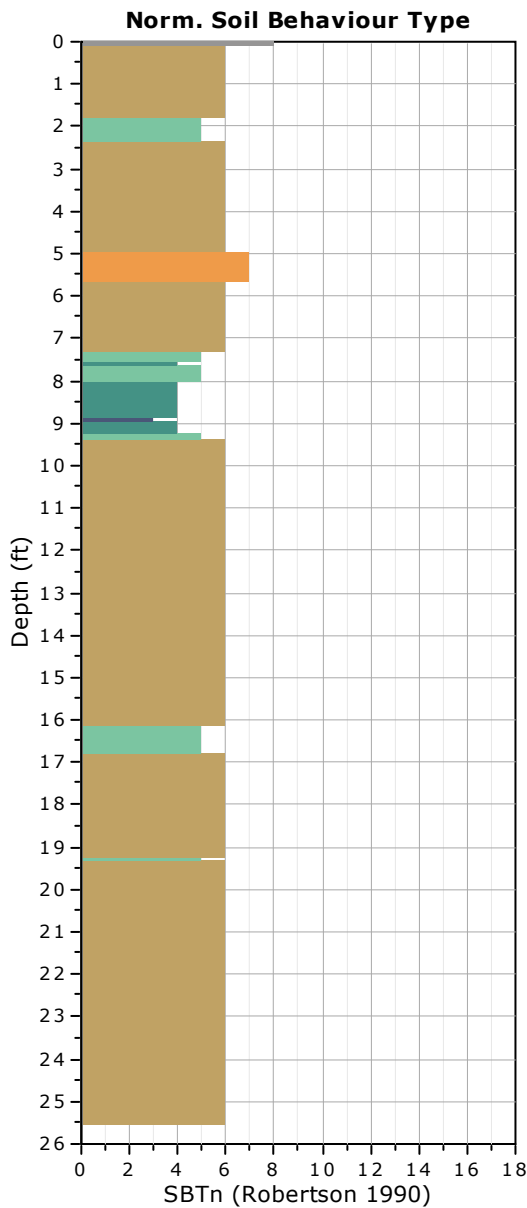
Location: Berlin, Maryland



The plot below presents the cross correlation coefficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two successive CPT measurements).

Cross correlation between qc & fs





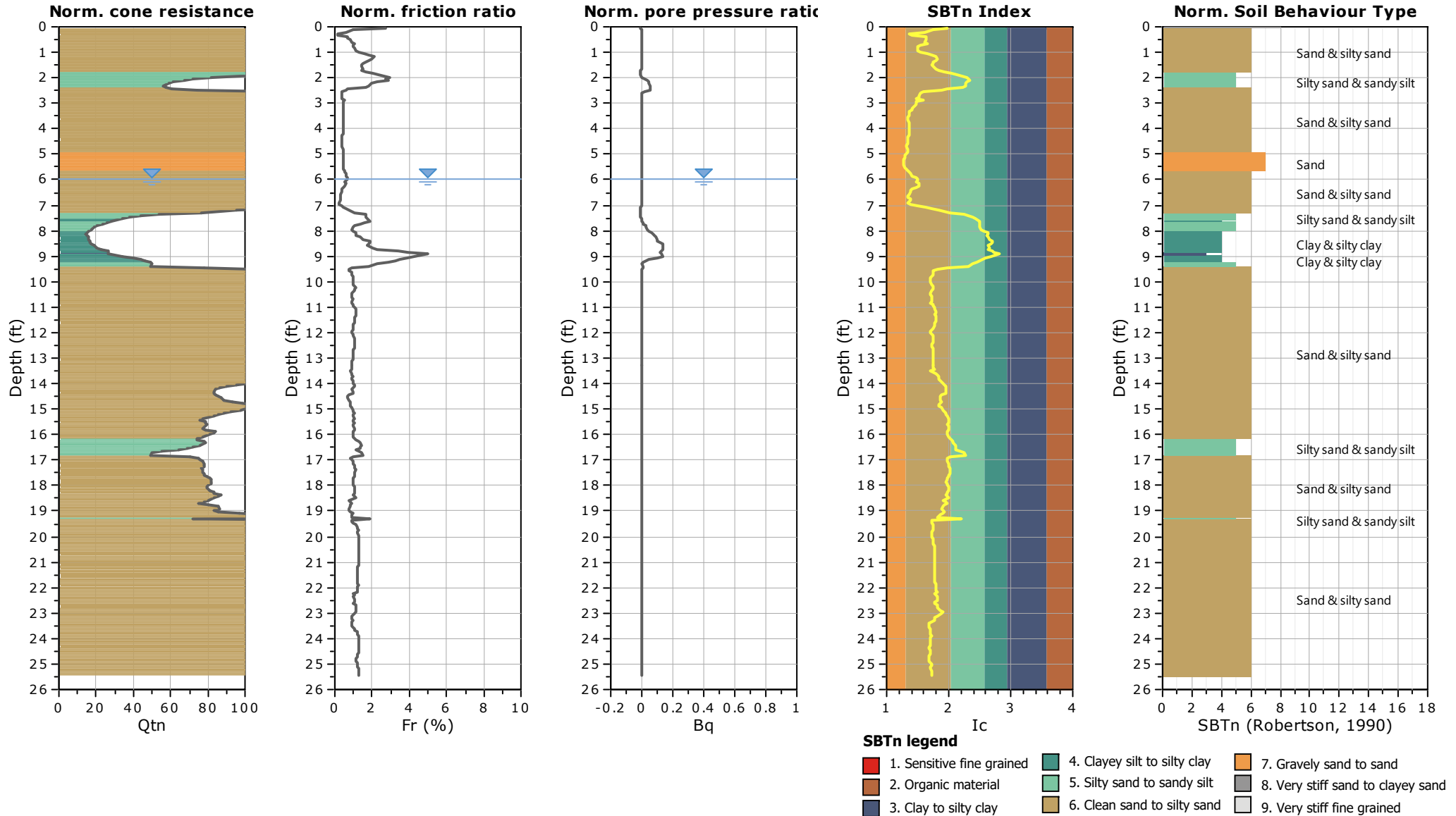
Fuzzy classification legend

- Highly probable clayey soil
- Highly probable mixture soil
- Highly probable sandy soil



Project: Riddle Farm Waste Water Treatment Plant

Location: Berlin, Maryland



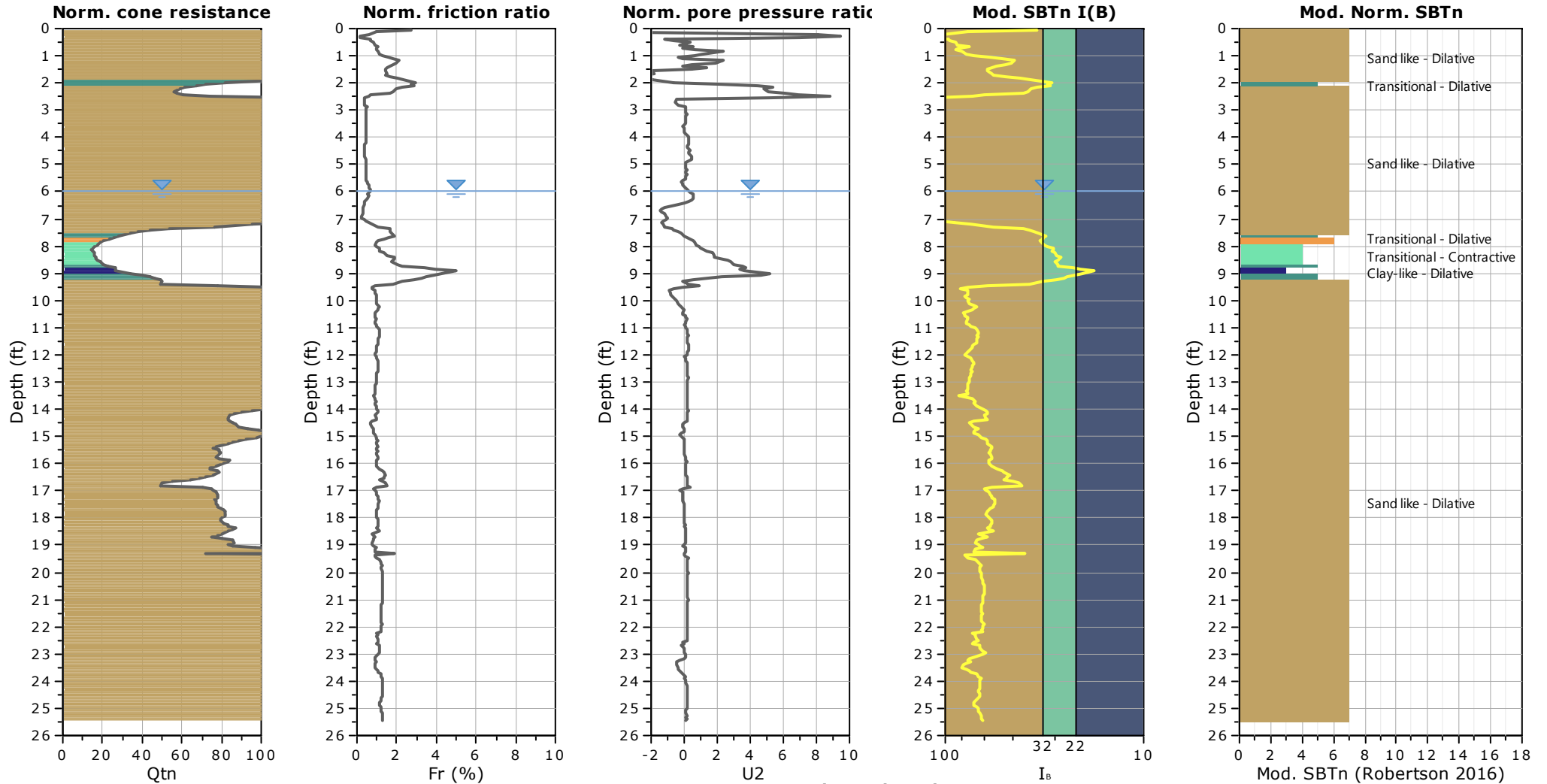
220047

00320 - 8



Project: Riddle Farm Waste Water Treatment Plant

Location: Berlin, Maryland



Mod. SBTn legend

- | | | |
|---|-----------------------------------|-----------------------------|
| 1. CCS: ClayLike - Contractive, Sensitive | 4. TC: Transitional - Contractive | 7. SD: Sand-like - Dilative |
| 2. CC: Clay-like - Contractive | 5. TD: Transitional - Dilative | |
| 3. CD: Clay-Like: Dilative | 6. SC: Sand-like - Contractive | |

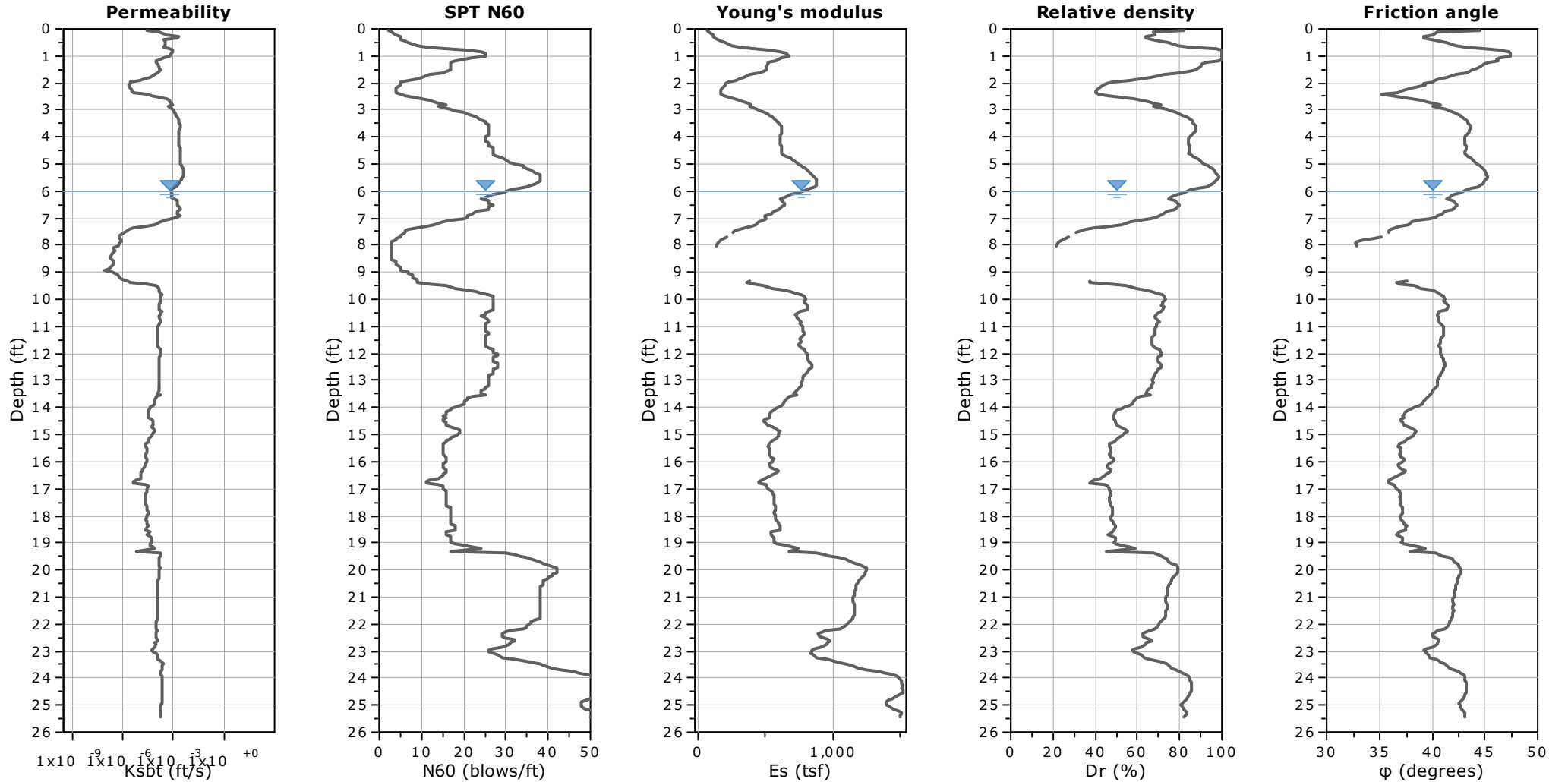
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00320 - 9



Project: Riddle Farm Waste Water Treatment Plant

Location: Berlin, Maryland



Calculation parameters

Permeability: Based on SBT_n

SPT N_{60} : Based on I_c and q_t

Young's modulus: Based on variable alpha using I_c (Robertson, 2009)

Relative density constant, C_{Dr} : 350.0

Phi: Based on Kulhawy & Mayne (1990)

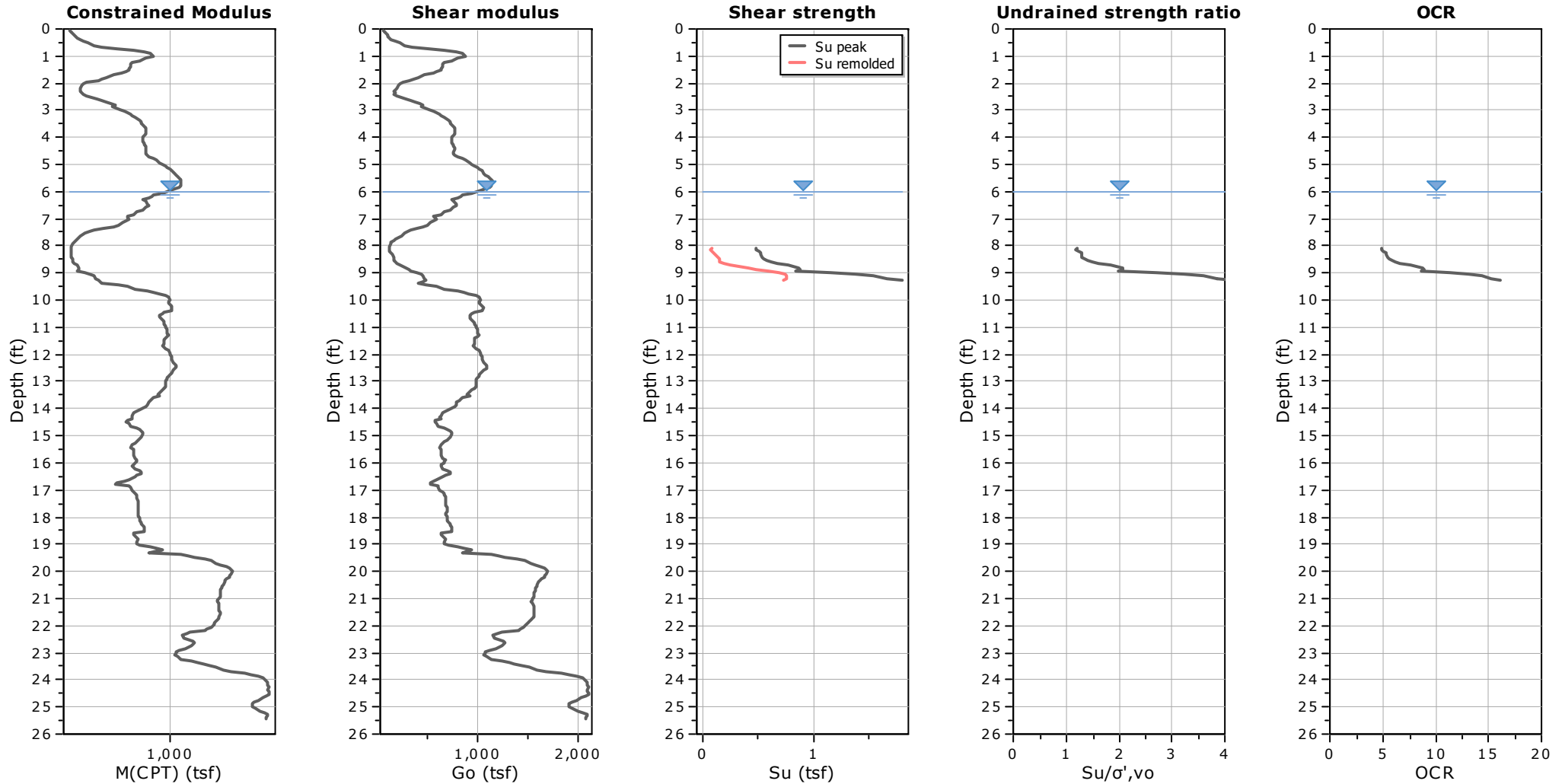
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00320 - 10



Project: Riddle Farm Waste Water Treatment Plant

Location: Berlin, Maryland



Calculation parameters

Constrained modulus: Based on variable α using I_c and Q_m (Robertson, 2009)

Go: Based on variable α using I_c (Robertson, 2009)

Undrained shear strength cone factor for clays, N_{kt} : 14

OCR factor for clays, N_{kt} : 0.33

● Flat Dilatometer Test data

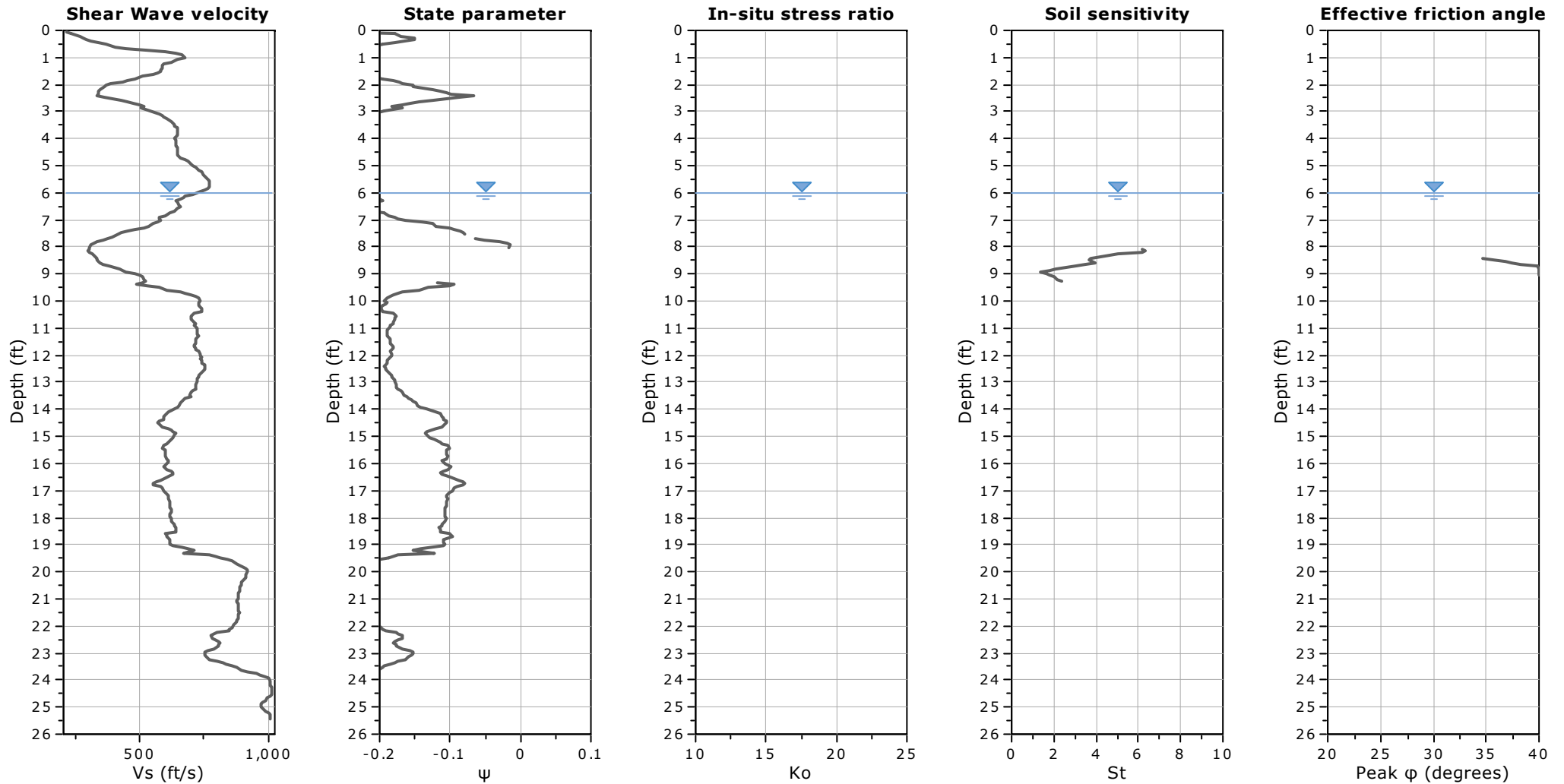
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00320 - 11



Project: Riddle Farm Waste Water Treatment Plant

Location: Berlin, Maryland



Calculation parameters

Soil Sensitivity factor, N_s : 7.00

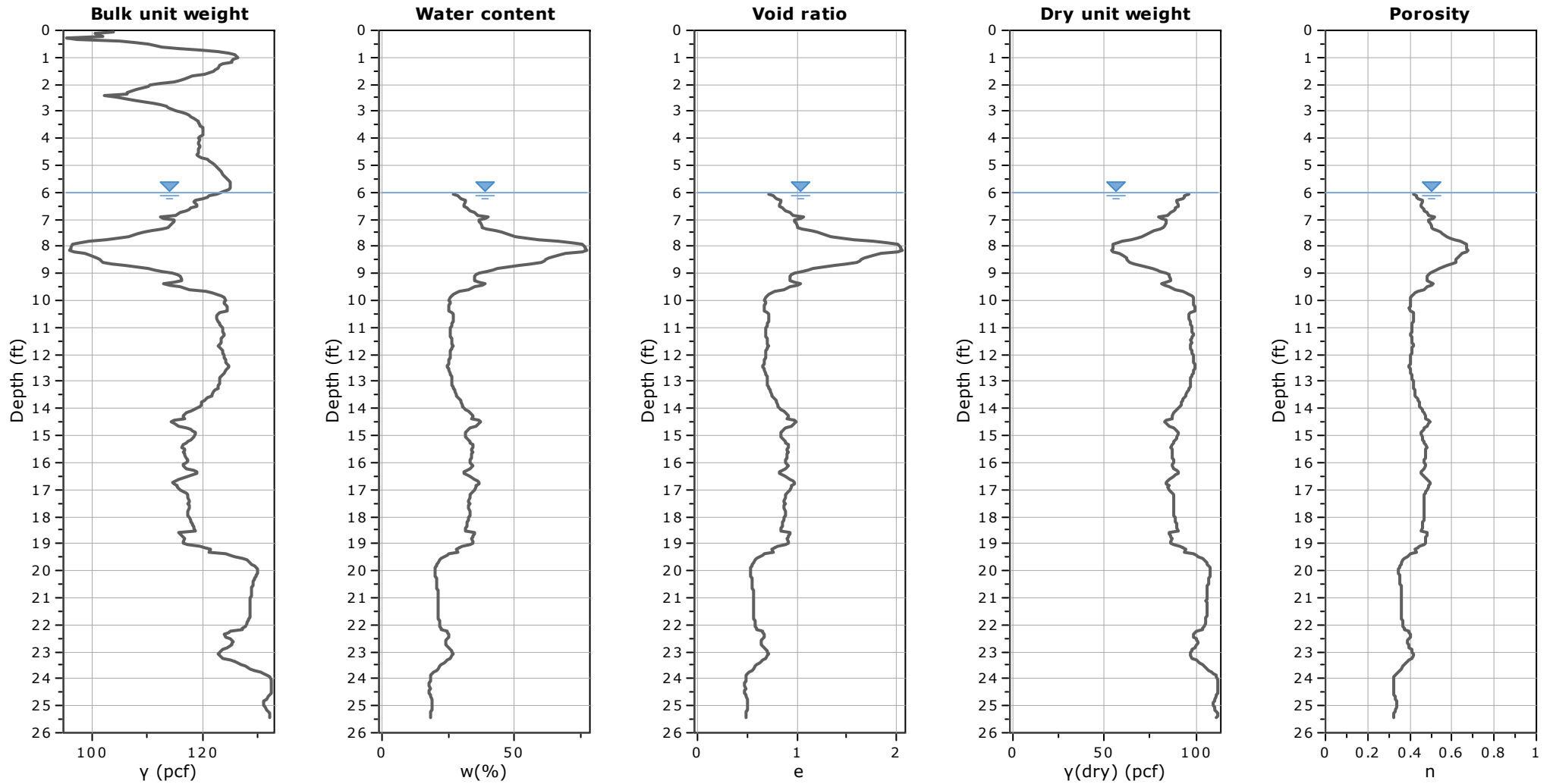
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00320 - 12



Project: Riddle Farm Waste Water Treatment Plant

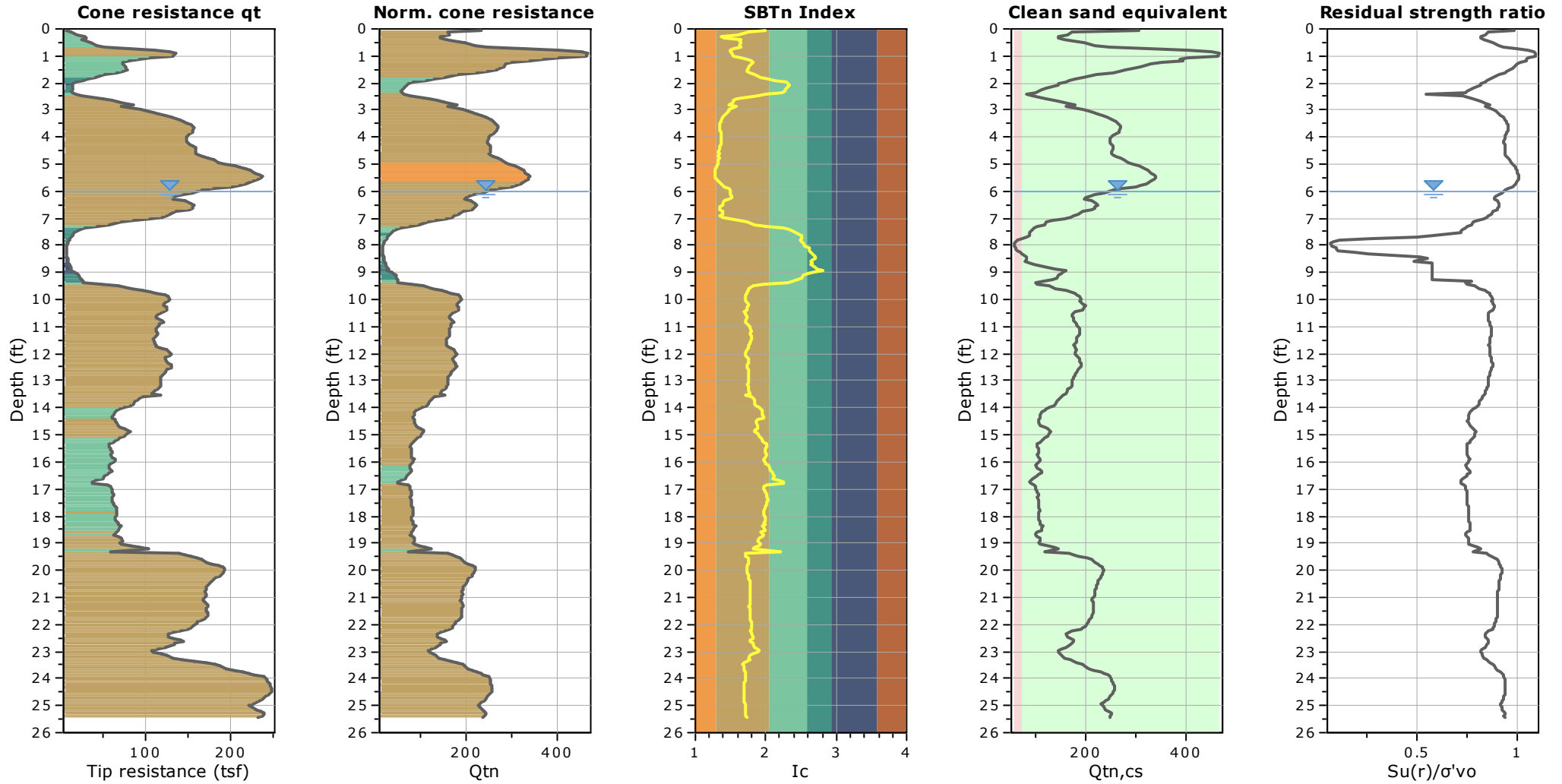
Location: Berlin, Maryland





Project: Riddle Farm Waste Water Treatment Plant

Location: Berlin, Maryland



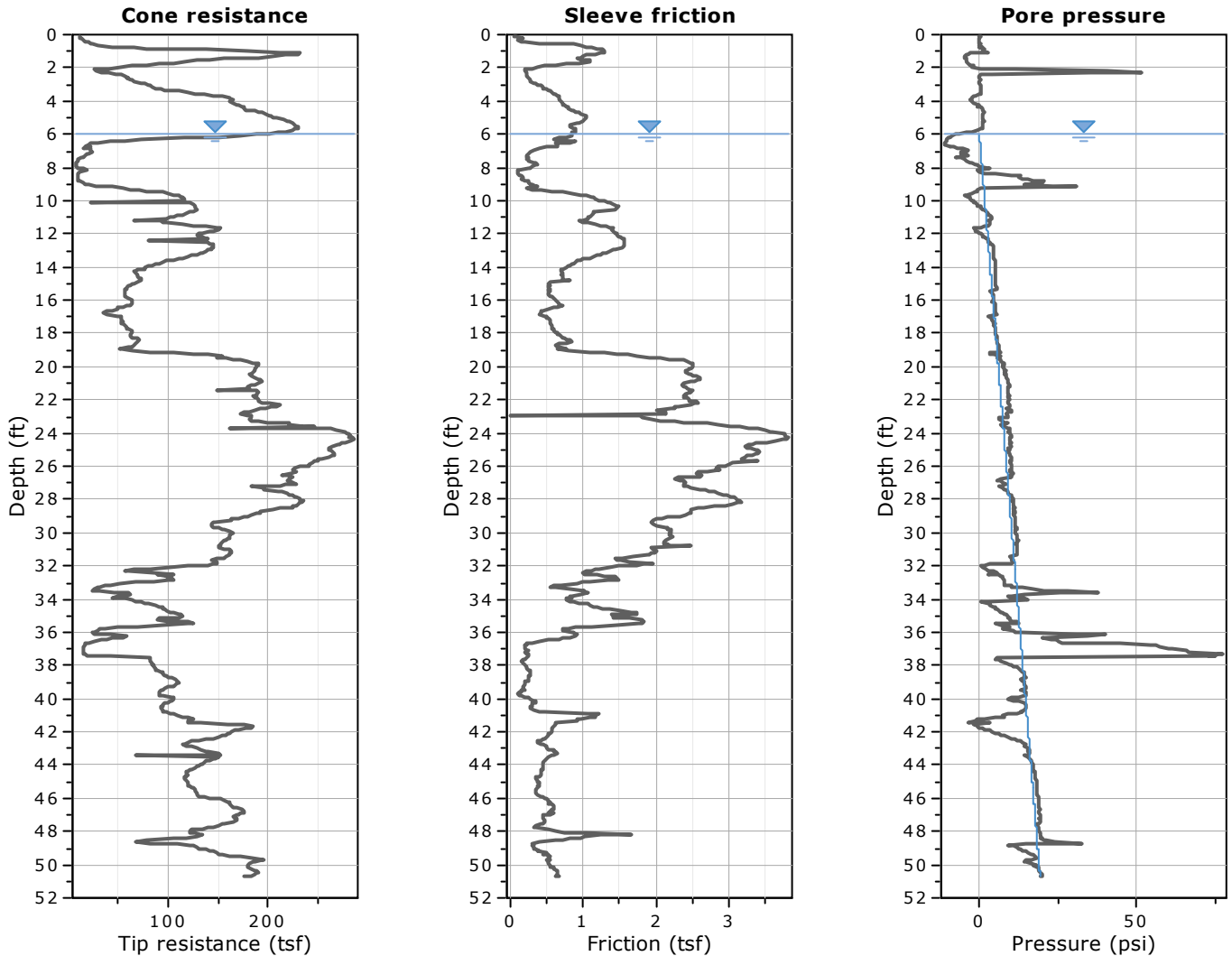
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00320 - 14



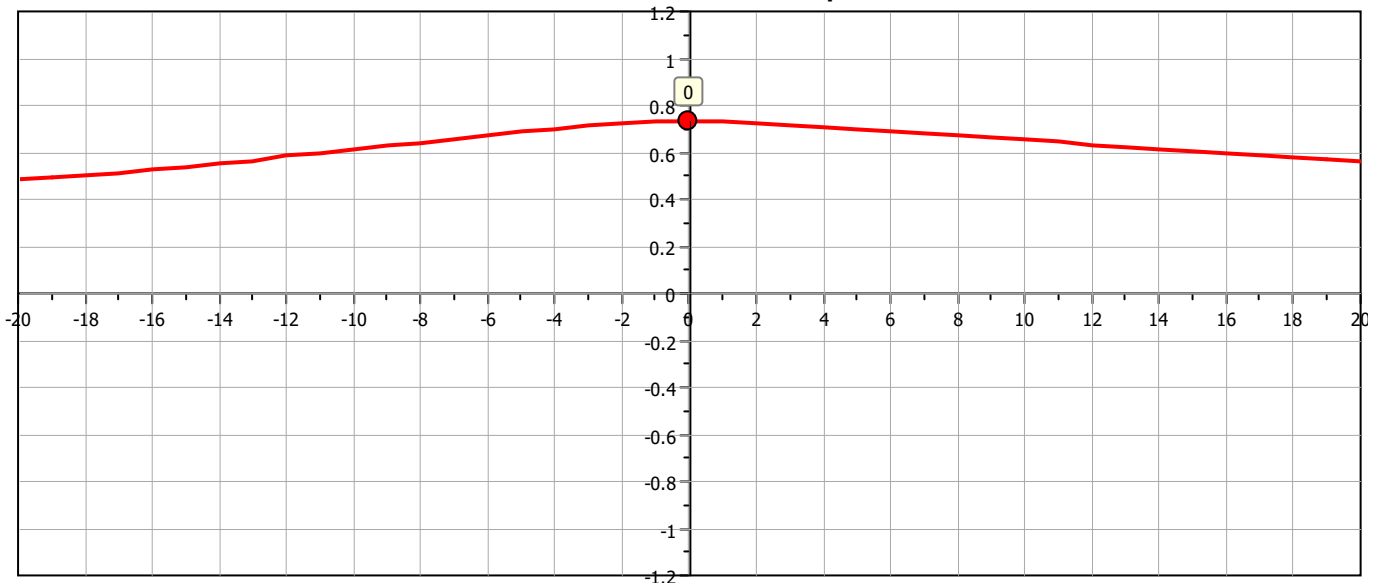
Project: Riddle Farm Waste Water Treatment Plant

Location: Berlin, Maryland



The plot below presents the cross correlation coefficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two successive CPT measurements).

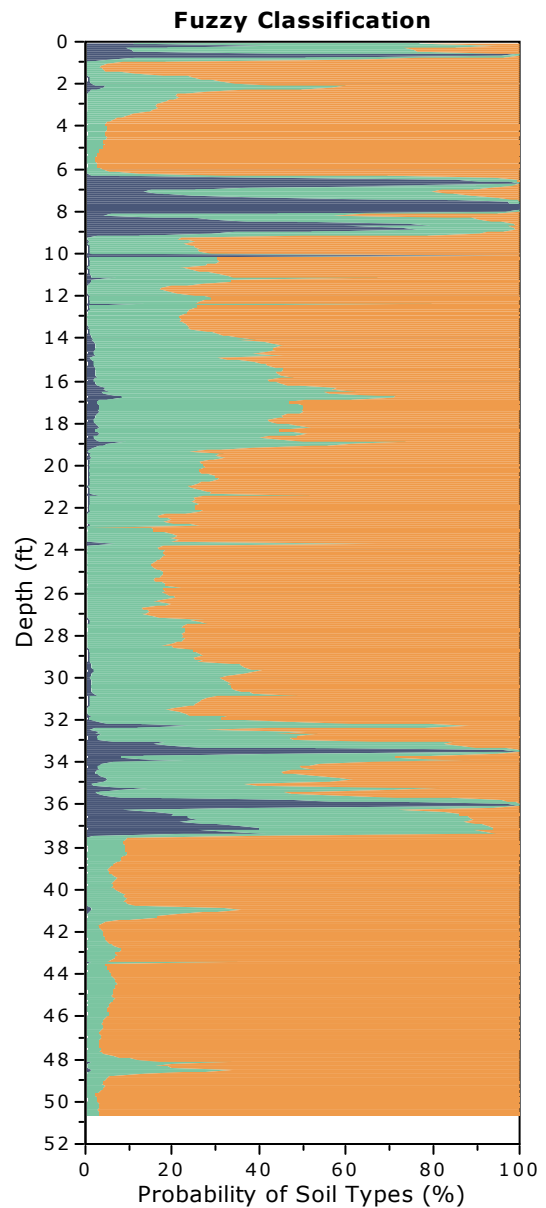
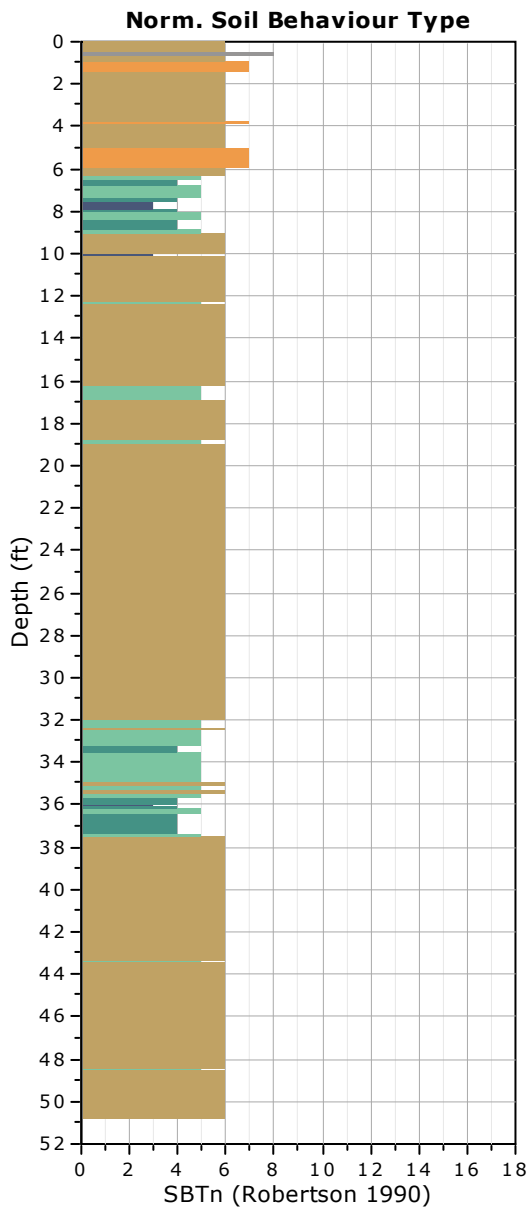
Cross correlation between qc & fs





Project: Riddle Farm Waste Water Treatment Plant

Location: Berlin, Maryland



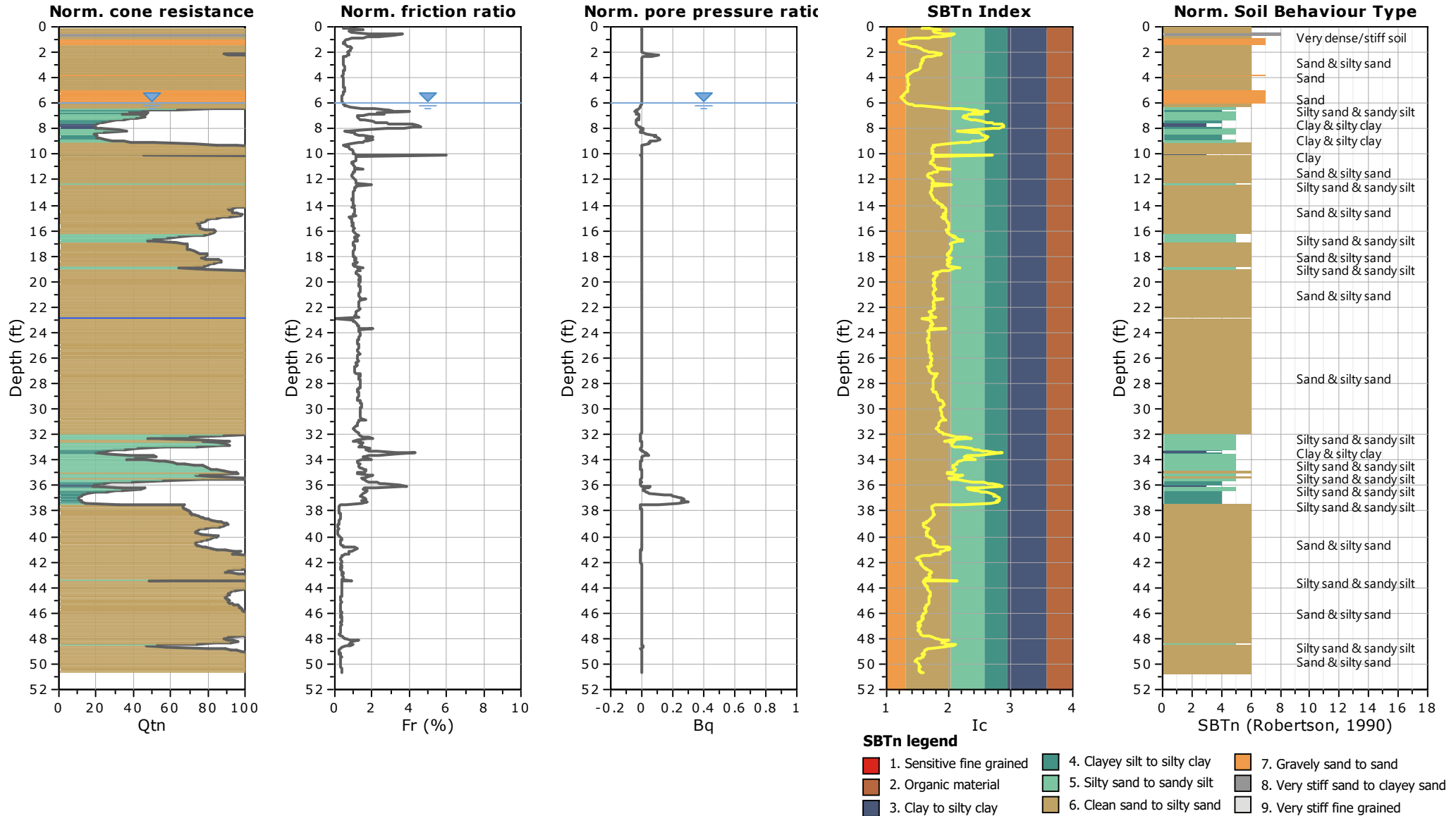
Fuzzy classification legend

- Highly probable clayey soil
- Highly probable mixture soil
- Highly probable sandy soil



Project: Riddle Farm Waste Water Treatment Plant

Location: Berlin, Maryland



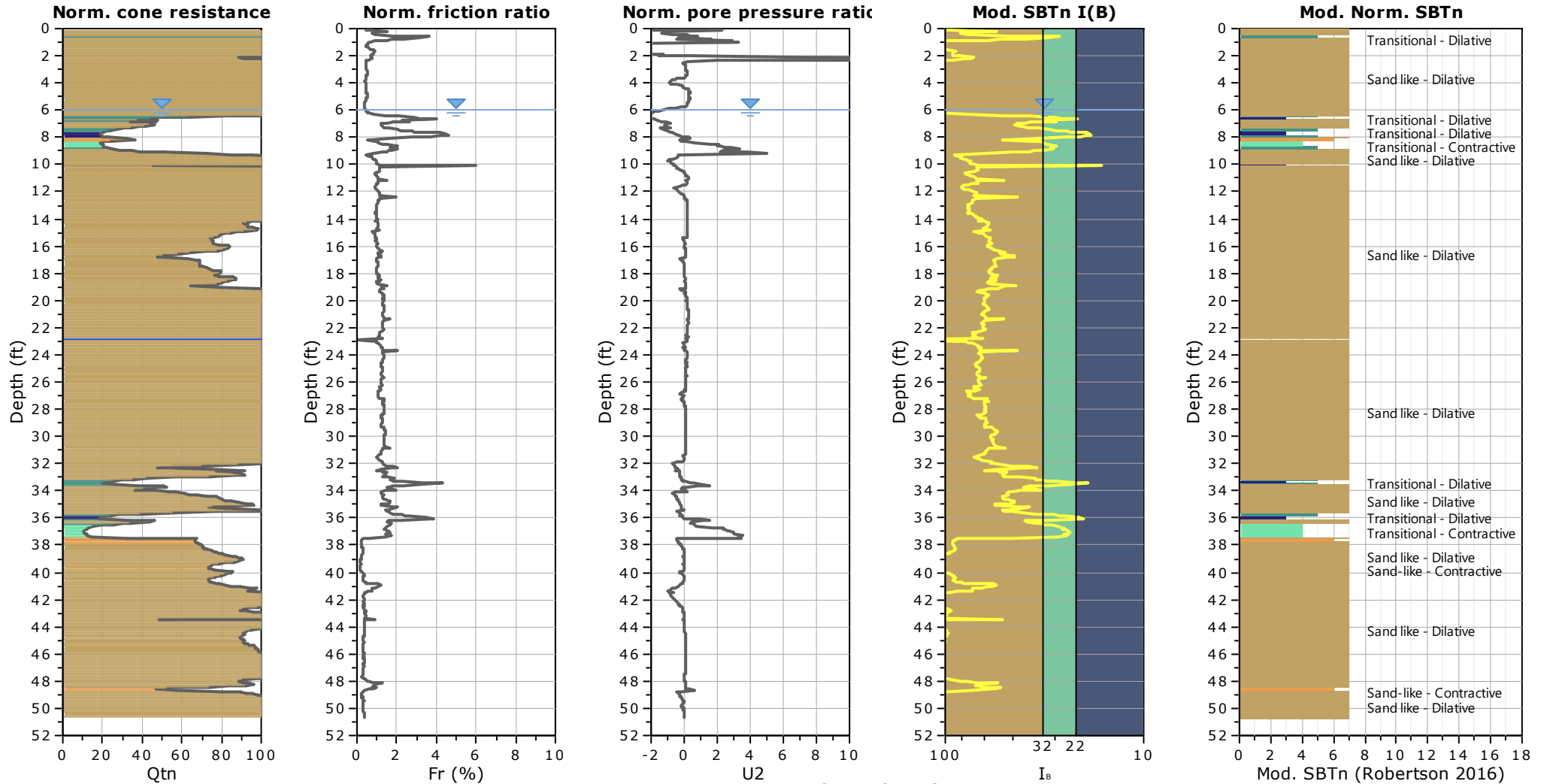
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00320 - 17



Project: Riddle Farm Waste Water Treatment Plant

Location: Berlin, Maryland



Mod. SBTn legend

1. CCS: ClayLike - Contractive, Sensitive	4. TC: Transitional - Contractive	7. SD: Sand-like - Dilative
2. CC: Clay-like - Contractive	5. TD: Transitional - Dilative	
3. CD: Clay-Like: Dilative	6. SC: Sand-like - Contractive	

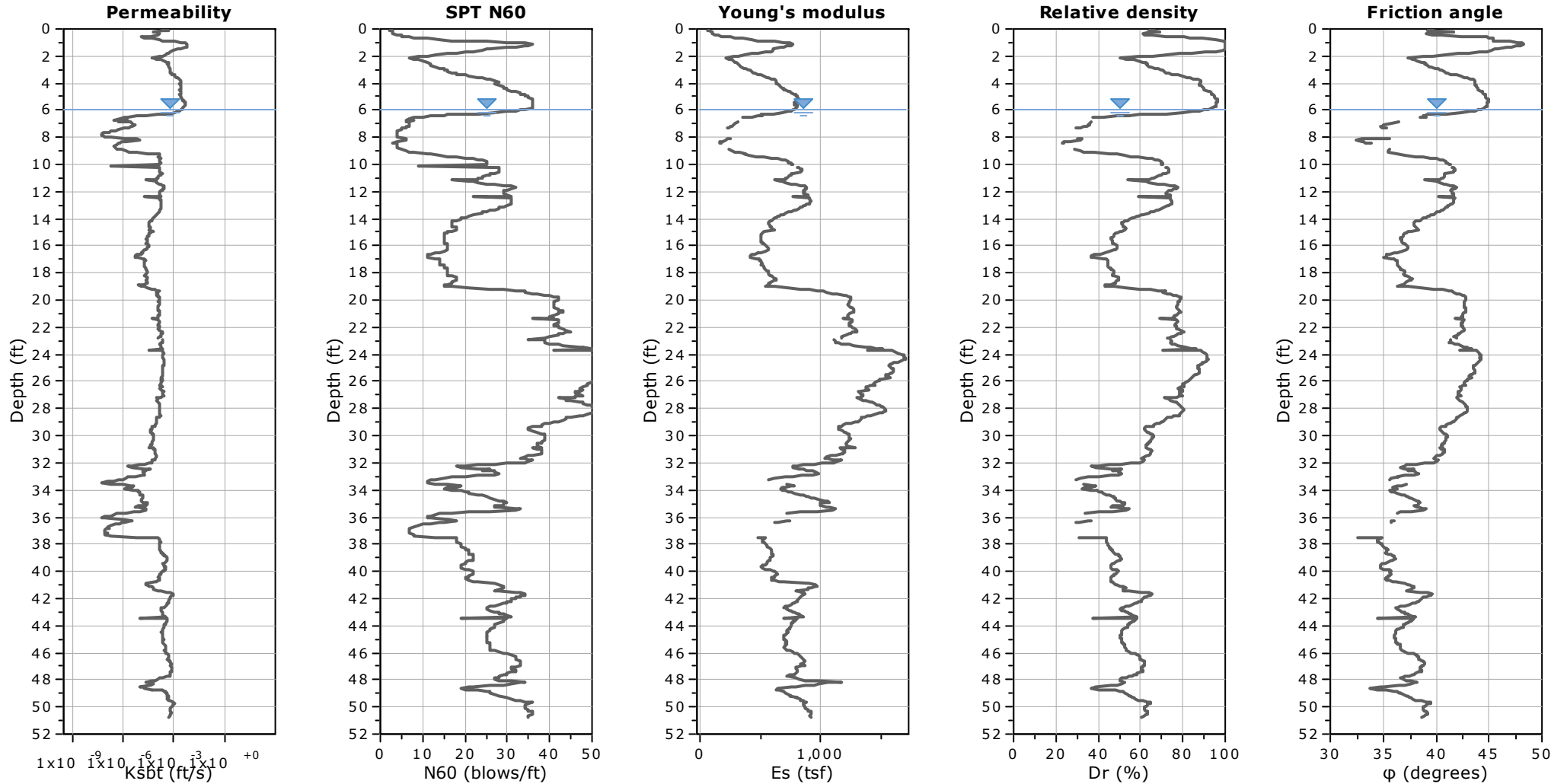
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00320 - 18



Project: Riddle Farm Waste Water Treatment Plant

Location: Berlin, Maryland



Calculation parameters

Permeability: Based on SBT_n

SPT N_{60} : Based on I_c and q_t

Young's modulus: Based on variable alpha using I_c (Robertson, 2009)

Relative density constant, C_{Dr} : 350.0

Phi: Based on Kulhawy & Mayne (1990)

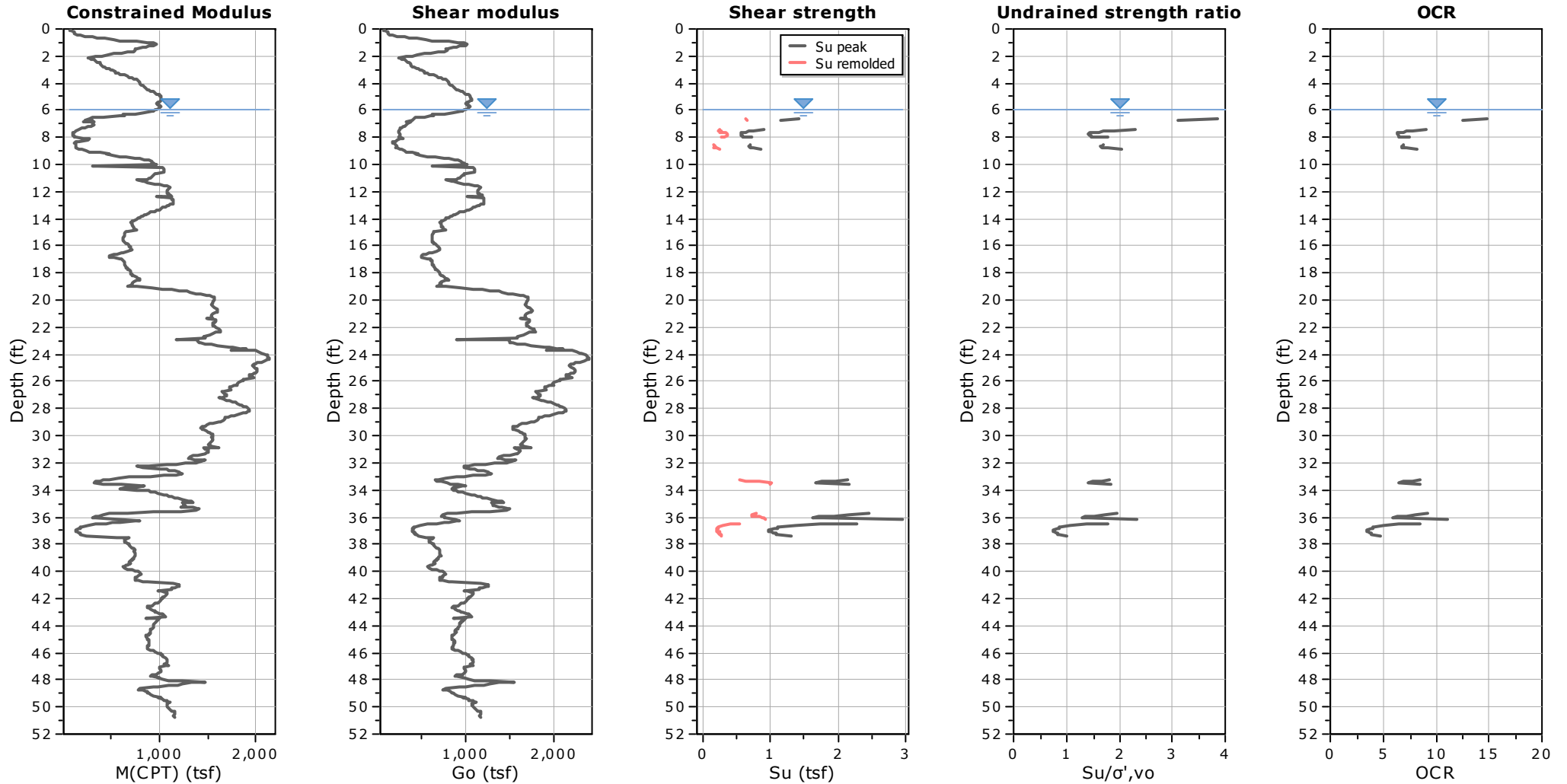
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00320 - 19



Project: Riddle Farm Waste Water Treatment Plant

Location: Berlin, Maryland



Calculation parameters

Constrained modulus: Based on variable α using I_c and Q_m (Robertson, 2009)

Go: Based on variable α using I_c (Robertson, 2009)

Undrained shear strength cone factor for clays, N_{kt} : 14

OCR factor for clays, N_{kt} : 0.33

● Flat Dilatometer Test data

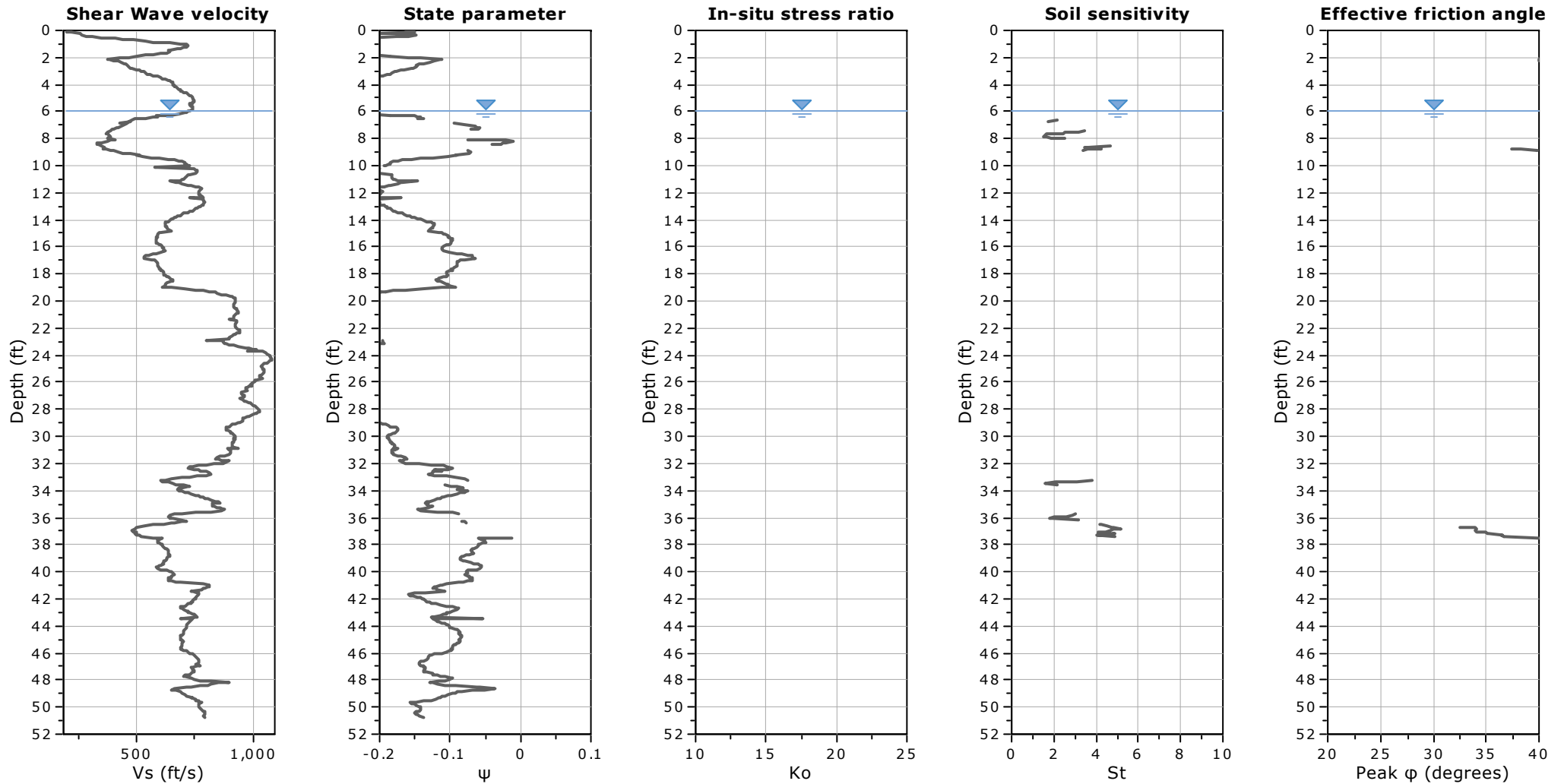
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00320 - 20



Project: Riddle Farm Waste Water Treatment Plant

Location: Berlin, Maryland

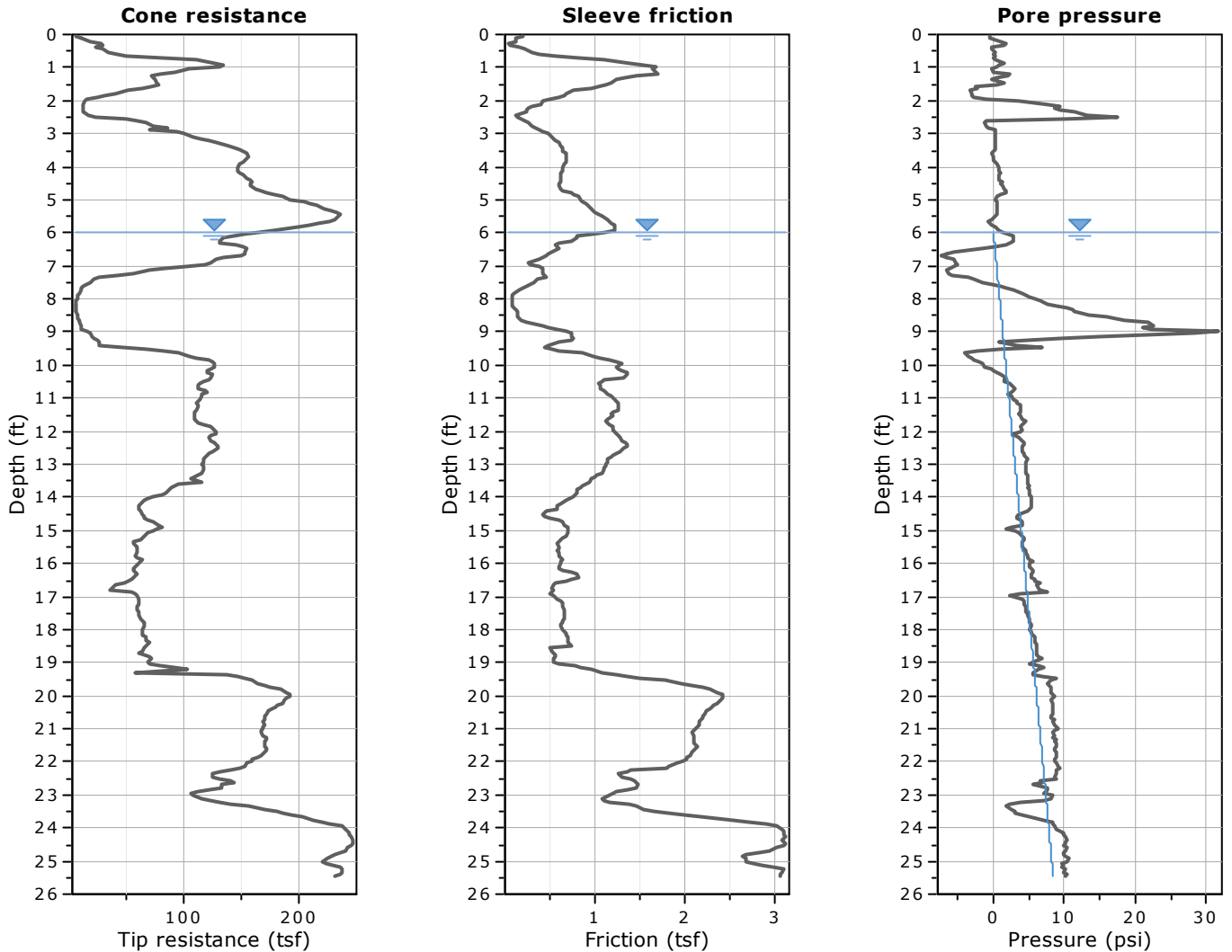


Calculation parameters

Soil Sensitivity factor, N_s : 7.00

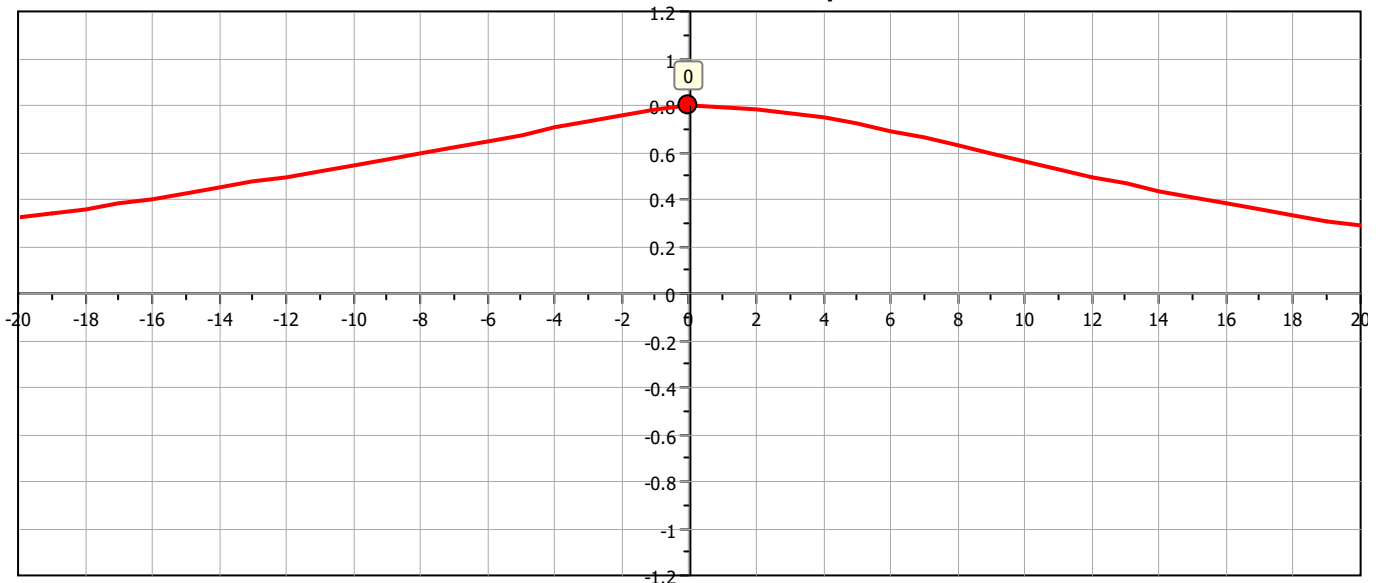
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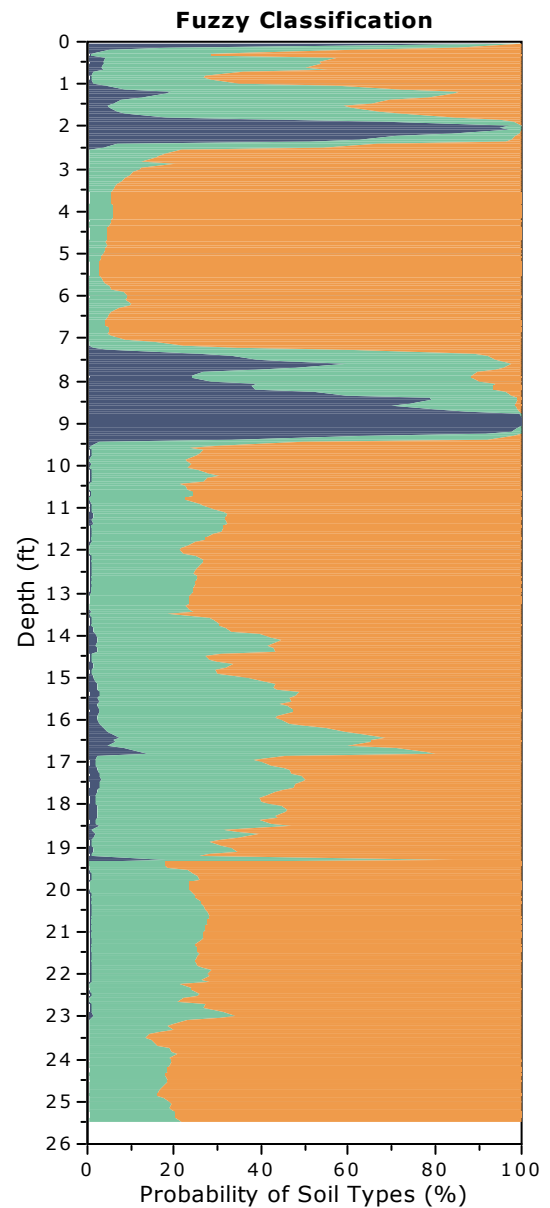
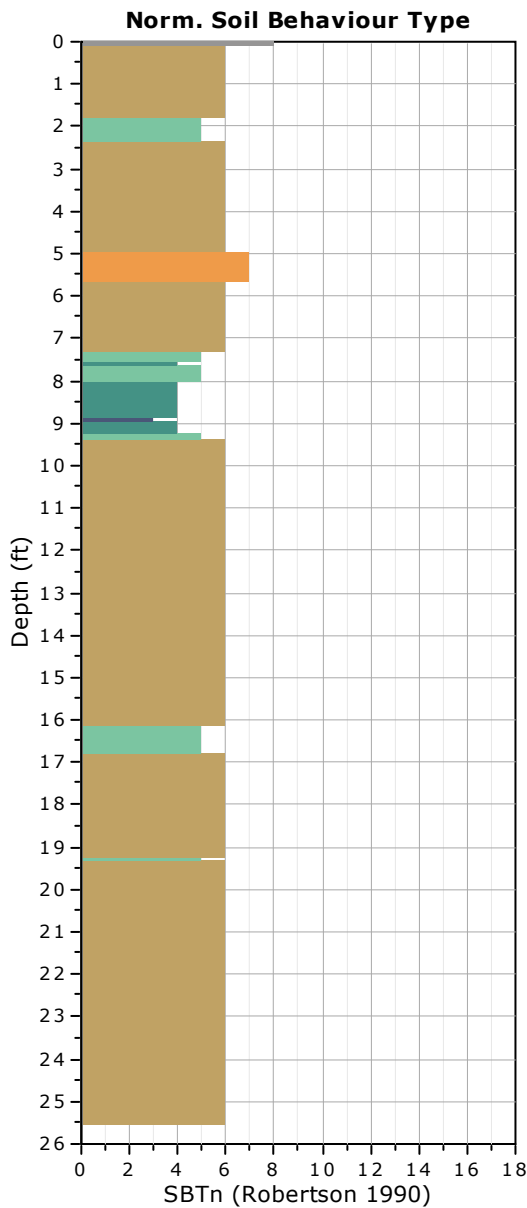
00320 - 21



The plot below presents the cross correlation coefficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two successive CPT measurements).

Cross correlation between qc & fs





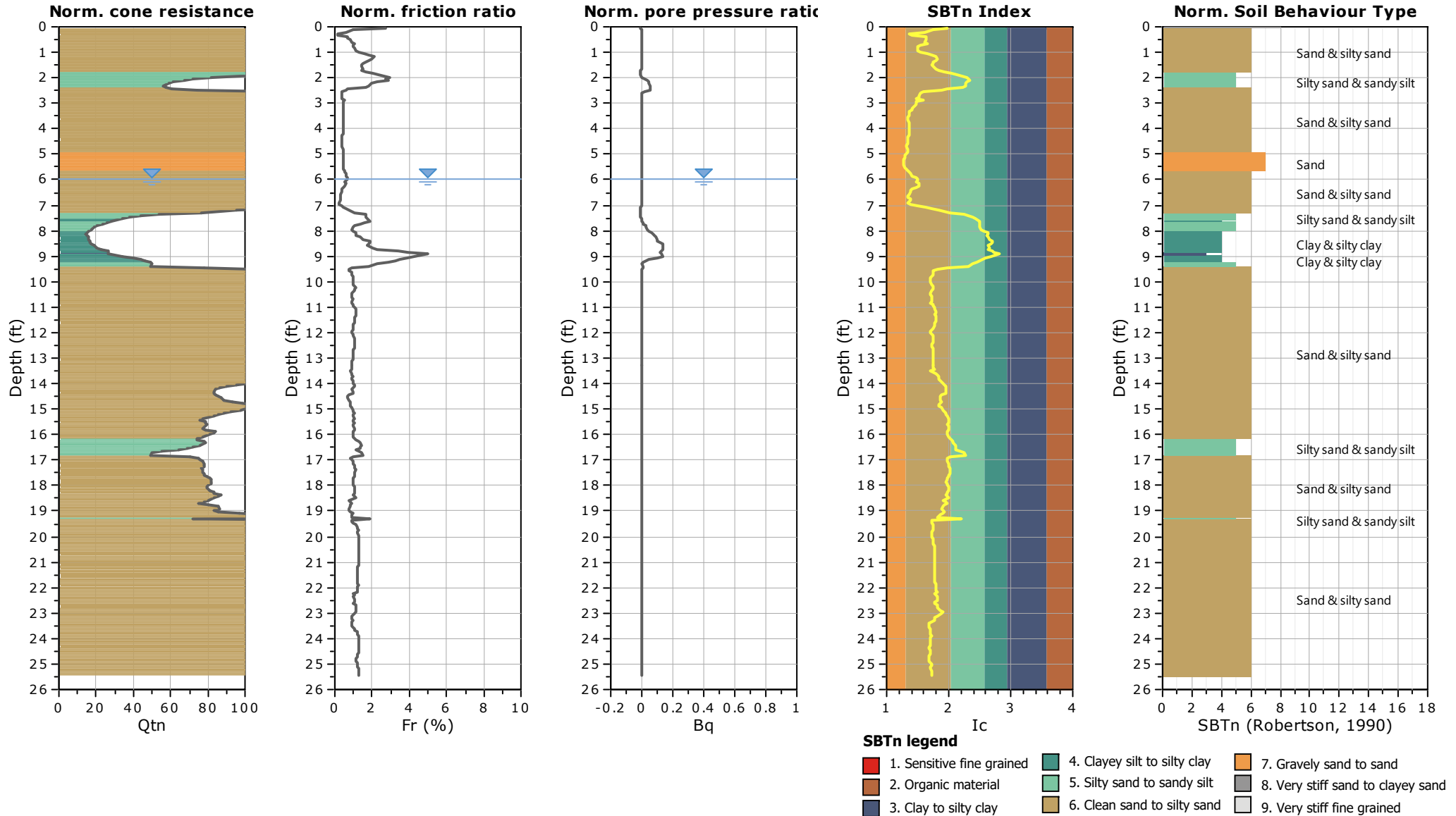
Fuzzy classification legend

- Highly probable clayey soil
- Highly probable mixture soil
- Highly probable sandy soil



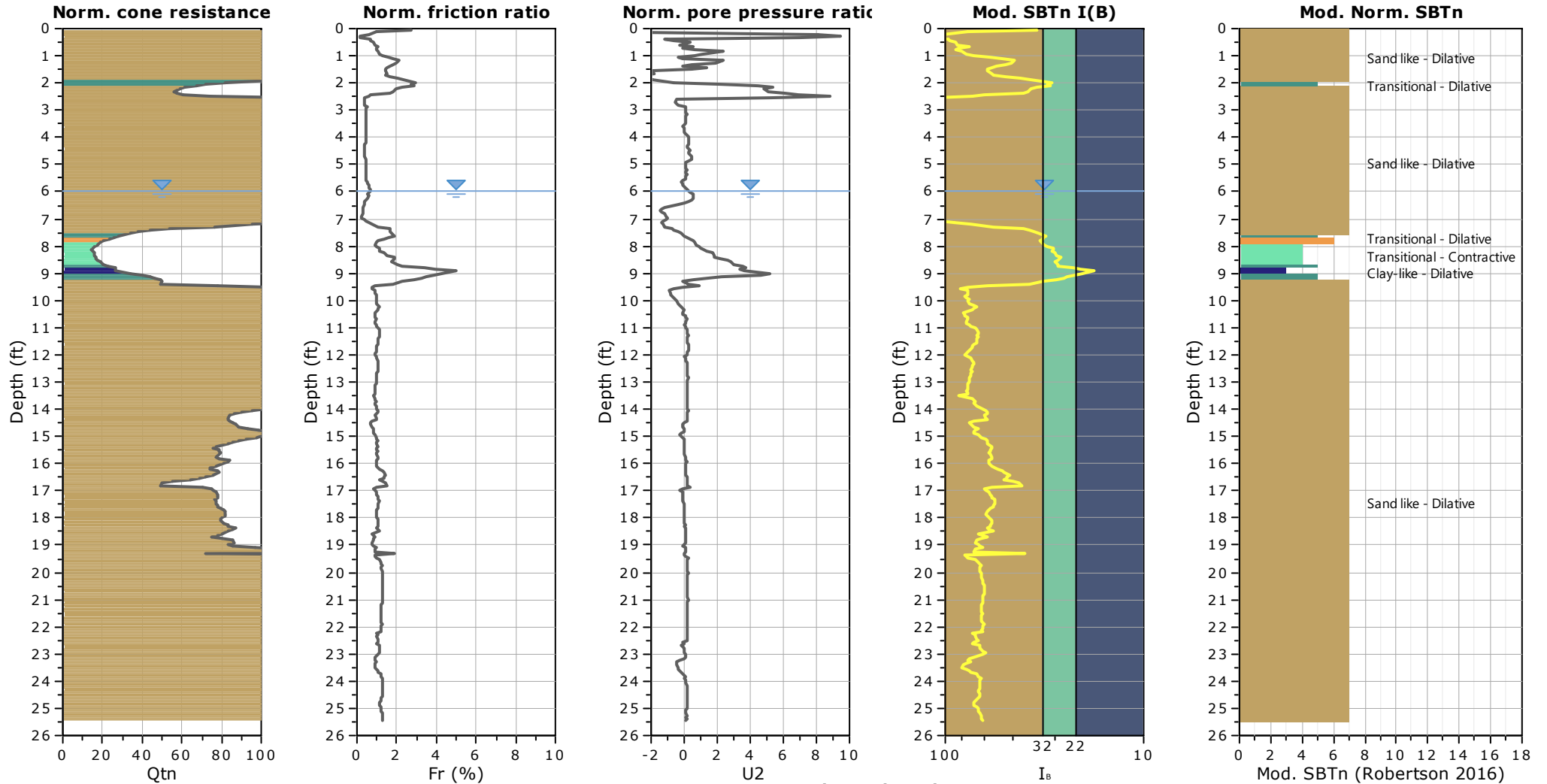
Project: Riddle Farm Waste Water Treatment Plant

Location: Berlin, Maryland



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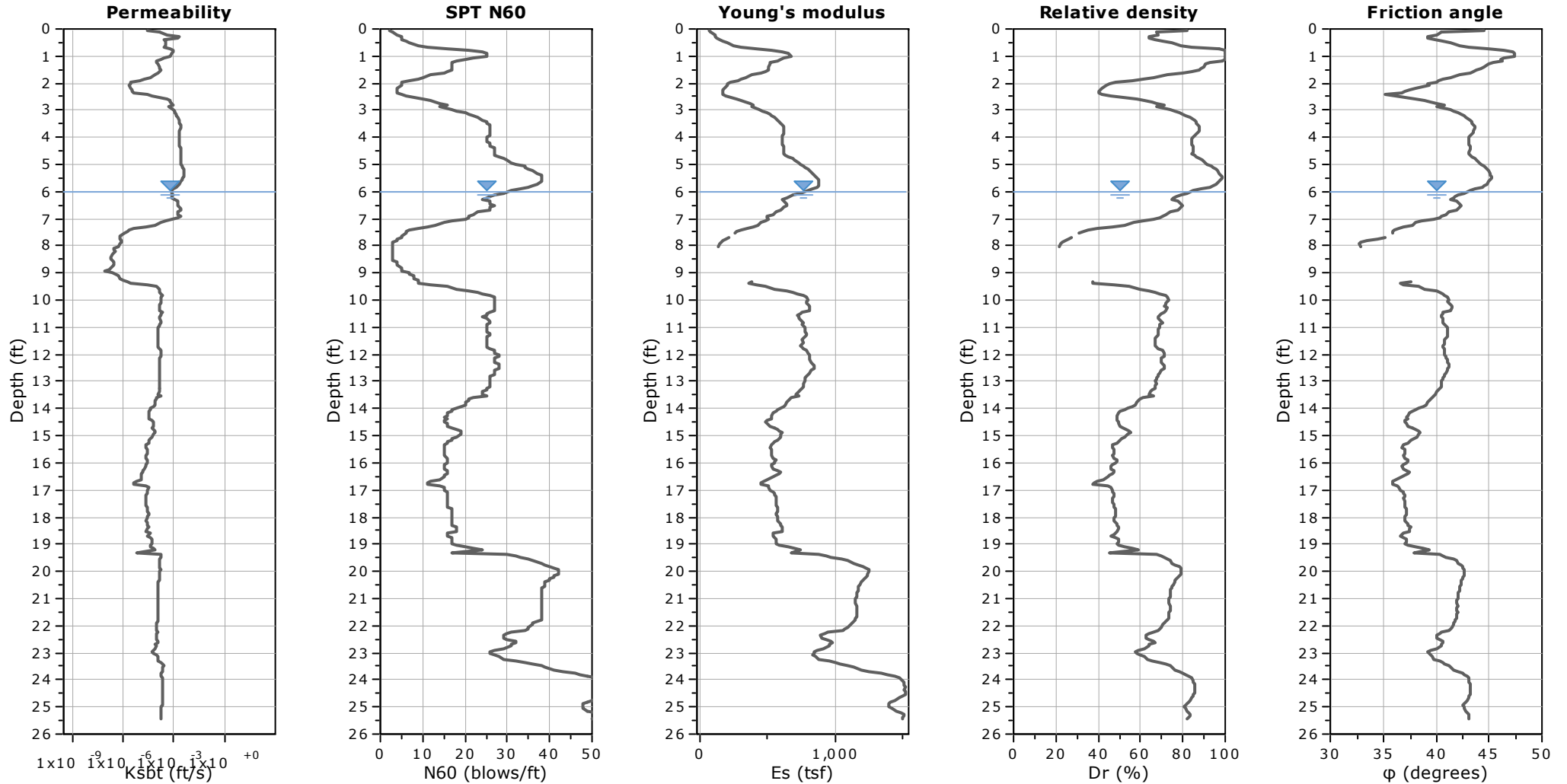
00320 - 24



- Mod. SBTn legend**
- 1. CCS: ClayLike - Contractive, Sensitive
 - 2. CC: Clay-like - Contractive
 - 3. CD: Clay-Like: Dilative
 - 4. TC: Transitional - Contractive
 - 5. TD: Transitional - Dilative
 - 6. SC: Sand-like - Contractive
 - 7. SD: Sand-like - Dilative

220047

00320 - 25



Calculation parameters

Permeability: Based on SBT_n

SPT N_{60} : Based on I_c and q_t

Young's modulus: Based on variable alpha using I_c (Robertson, 2009)

Relative density constant, C_{Dr} : 350.0

Phi: Based on Kulhawy & Mayne (1990)

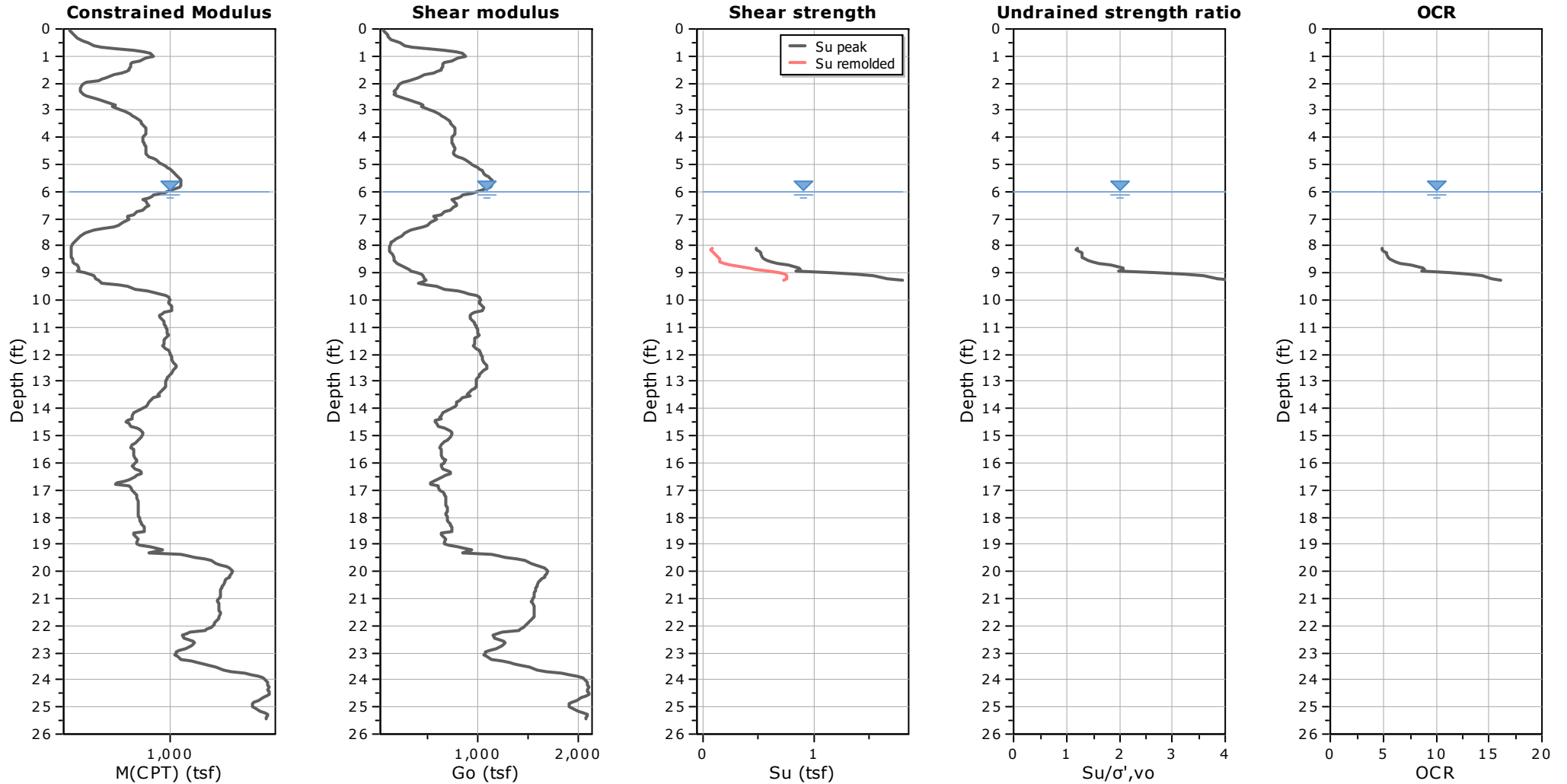
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00320 - 26



Project: Riddle Farm Waste Water Treatment Plant

Location: Berlin, Maryland



Calculation parameters

Constrained modulus: Based on variable *alpha* using I_c and Q_m (Robertson, 2009)

Go: Based on variable *alpha* using I_c (Robertson, 2009)

Undrained shear strength cone factor for clays, N_{kt} : 14

OCR factor for clays, N_{kt} : 0.33

● Flat Dilatometer Test data

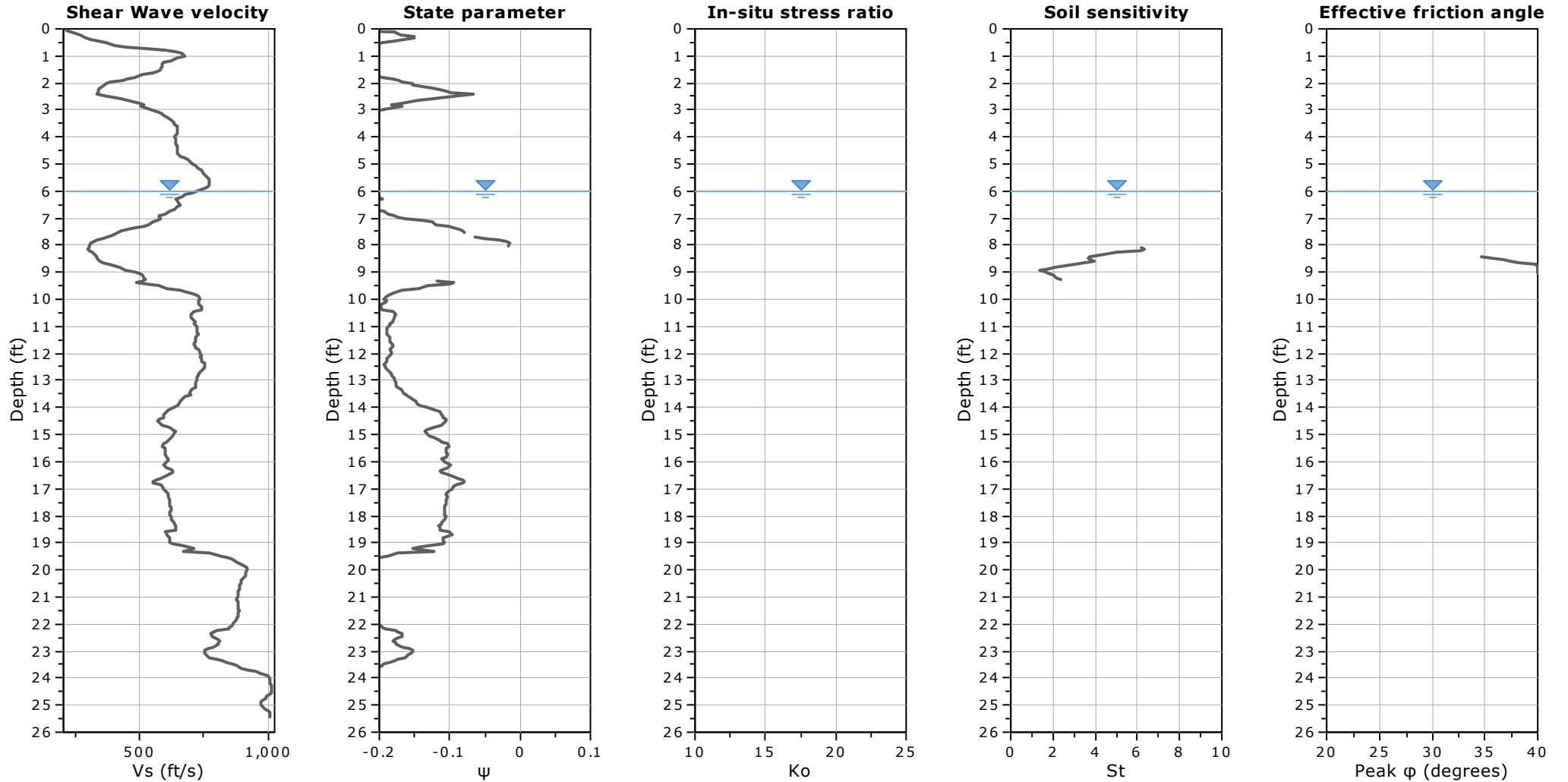
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00320 - 27



Project: Riddle Farm Waste Water Treatment Plant

Location: Berlin, Maryland



Calculation parameters

Soil Sensitivity factor, N_s : 7.00

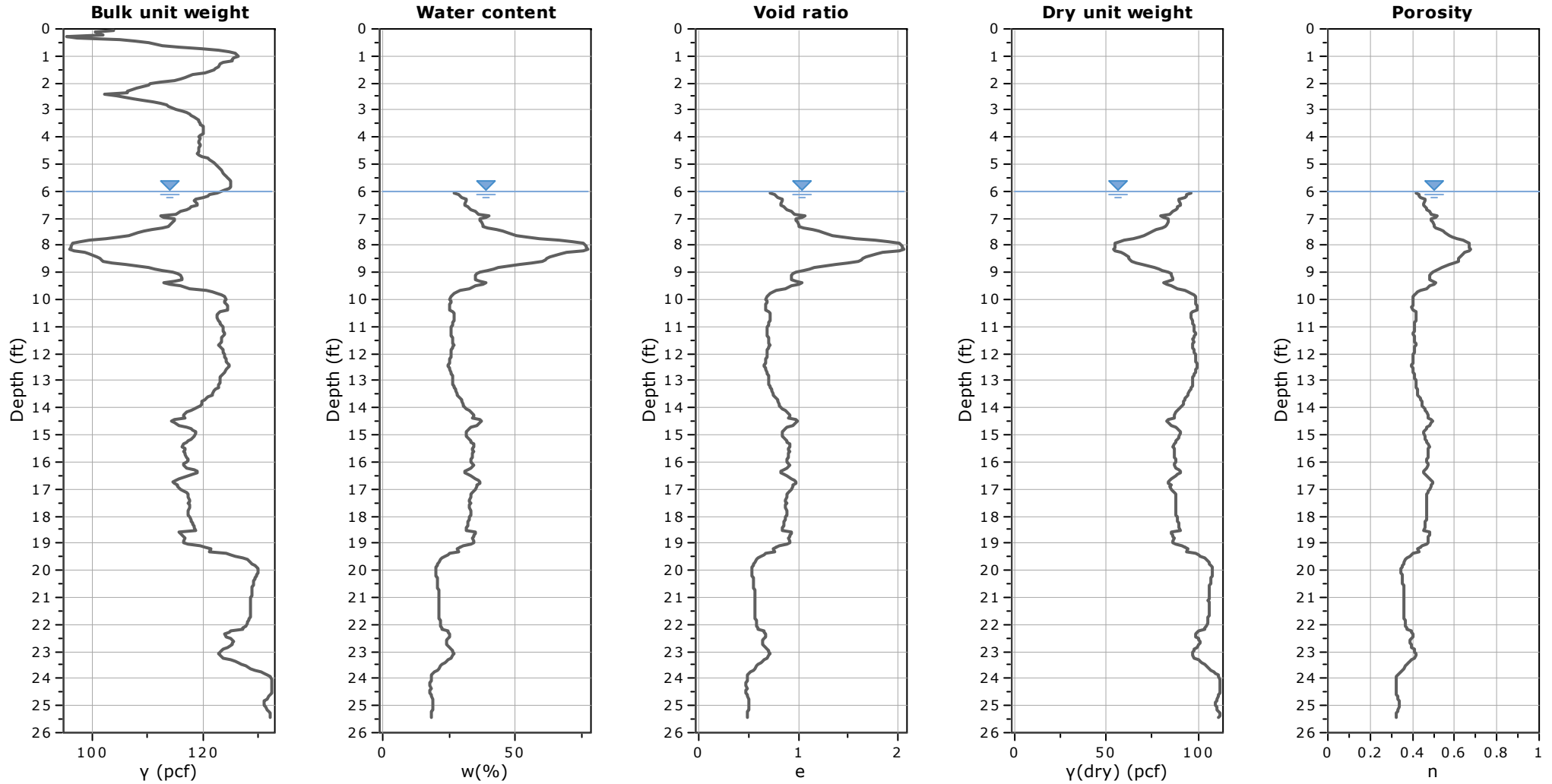
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00320 - 28



Project: Riddle Farm Waste Water Treatment Plant

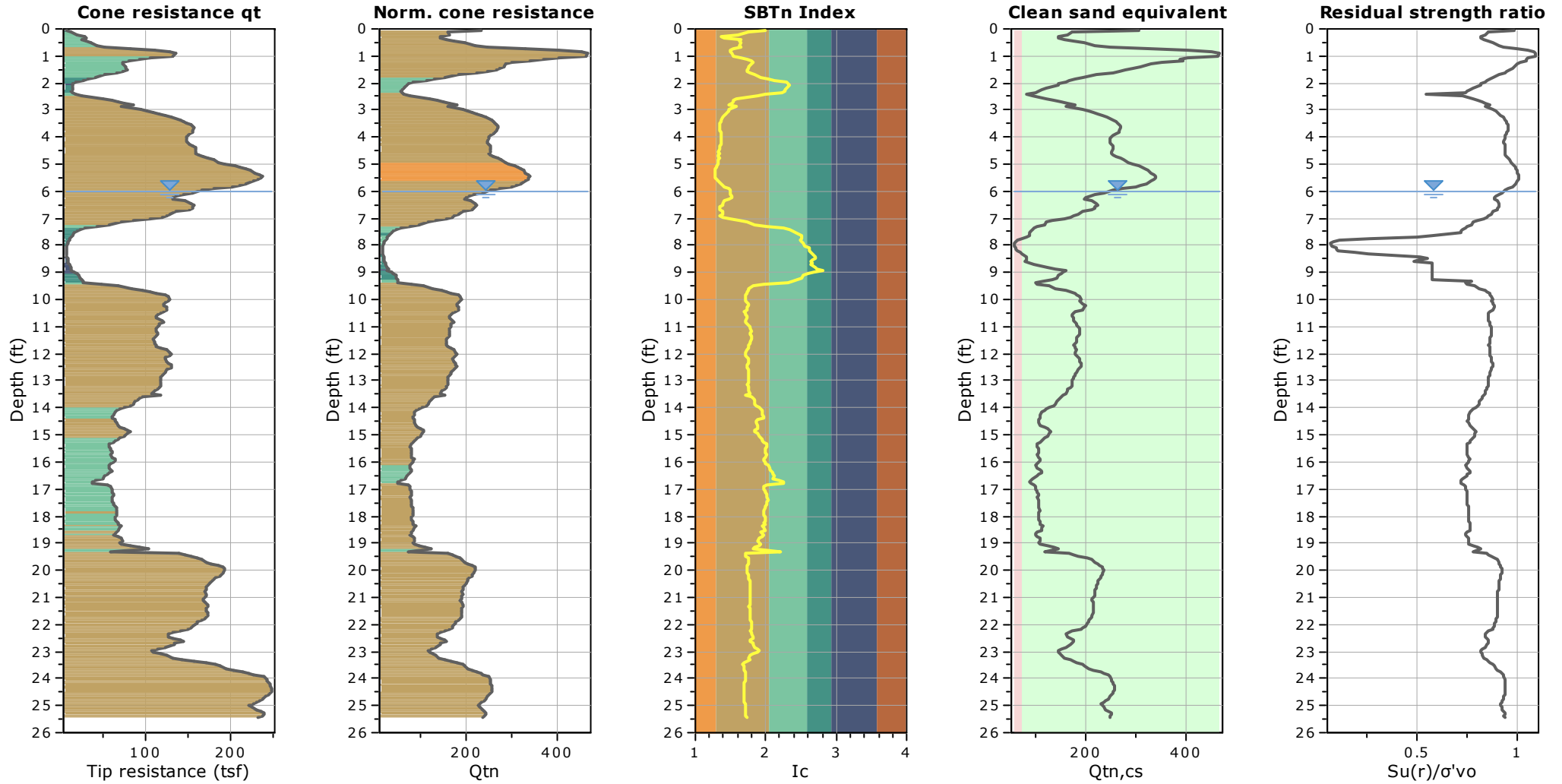
Location: Berlin, Maryland





Project: Riddle Farm Waste Water Treatment Plant

Location: Berlin, Maryland

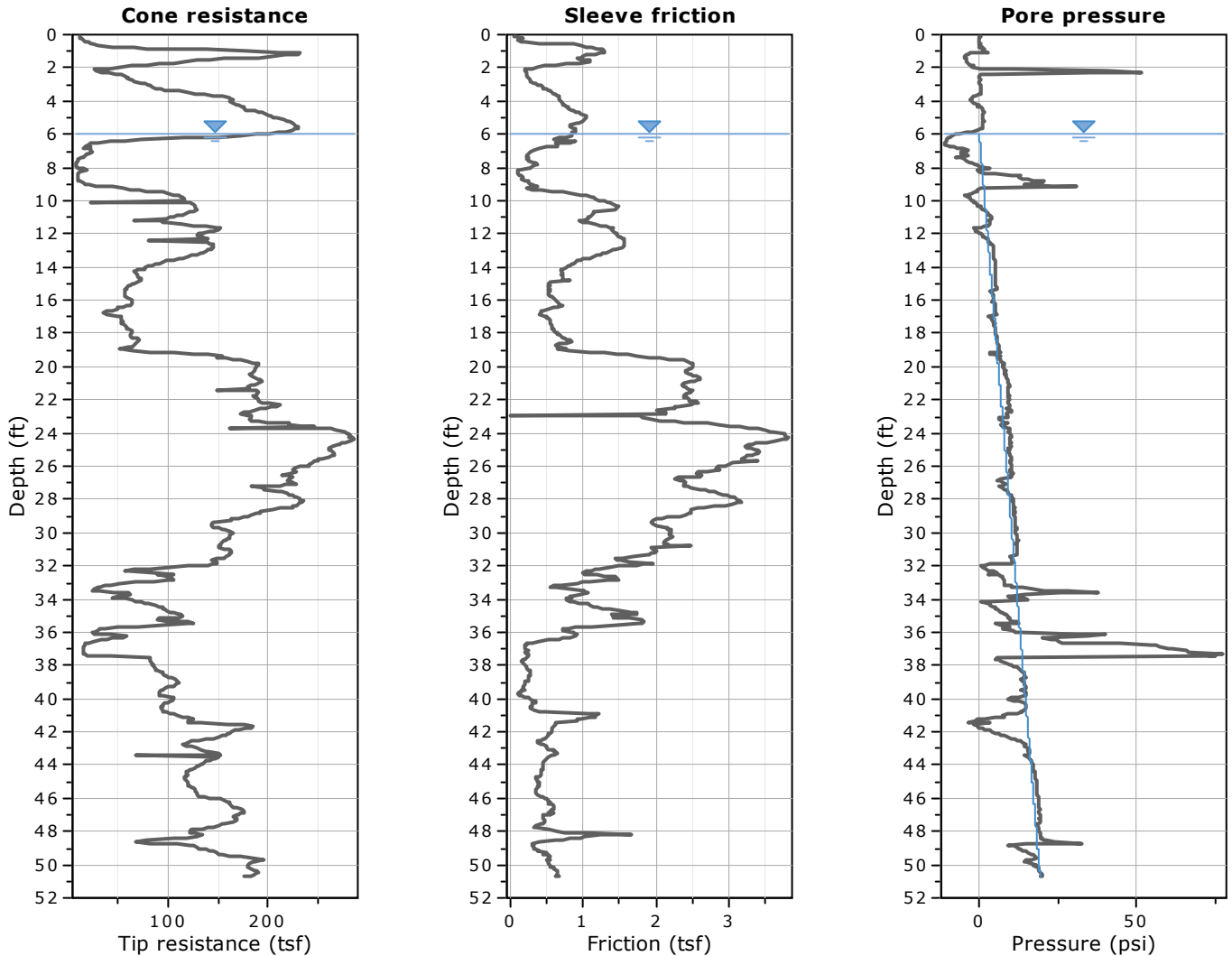


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00320 - 30

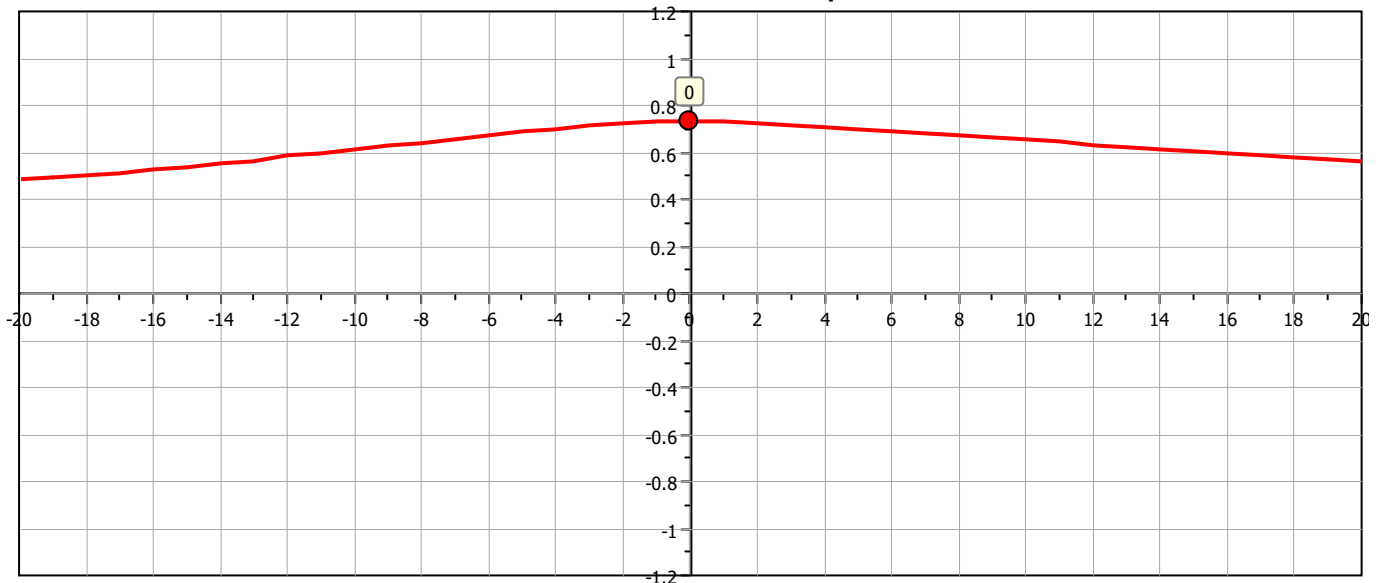


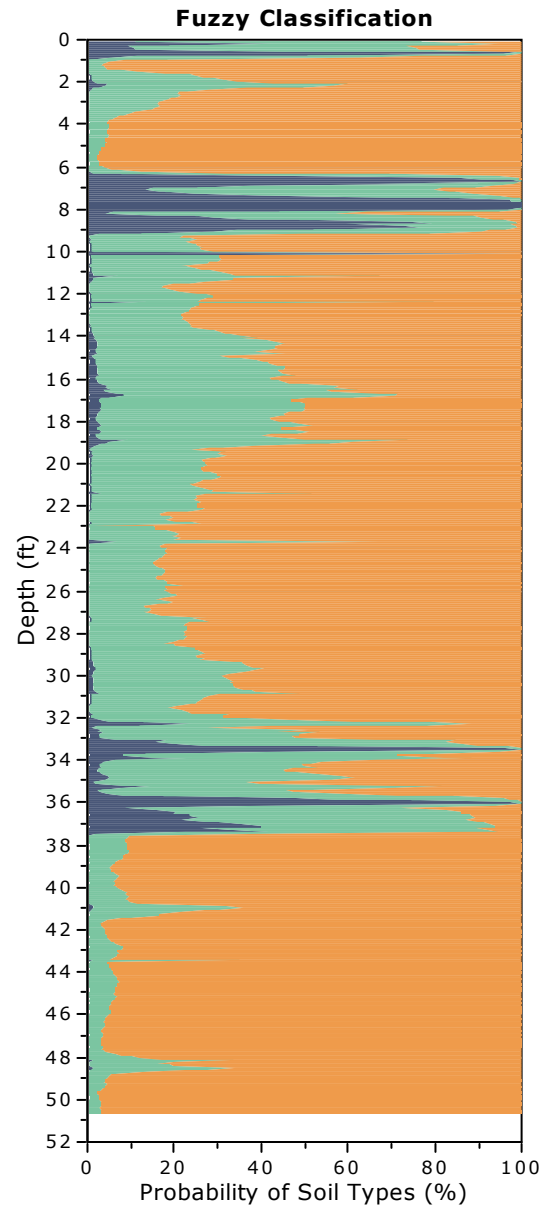
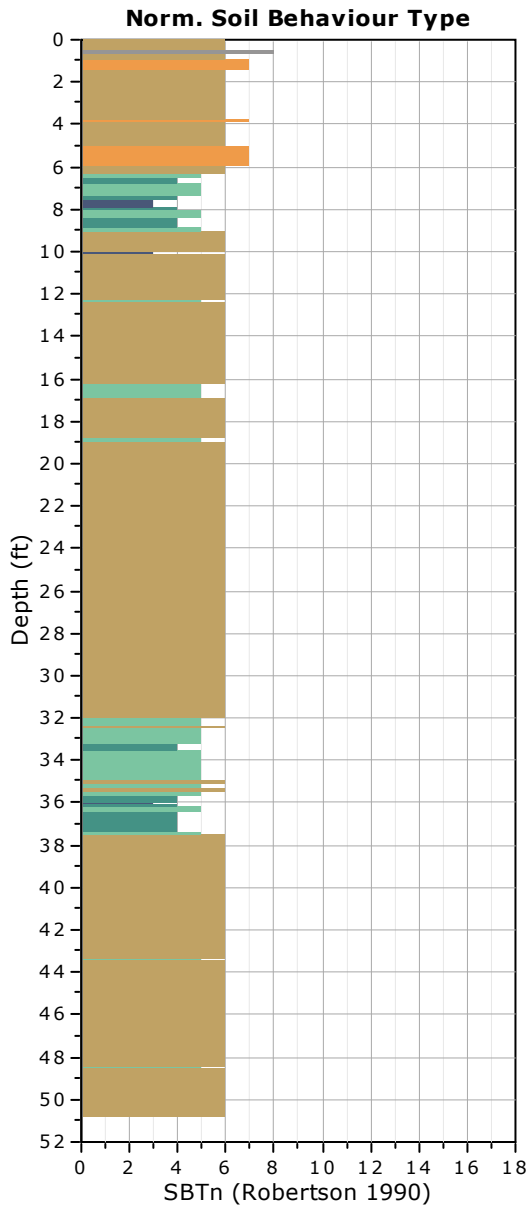
Project: Riddle Farm Waste Water Treatment Plant
Location: Berlin, Maryland



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Cross correlation between qc & fs





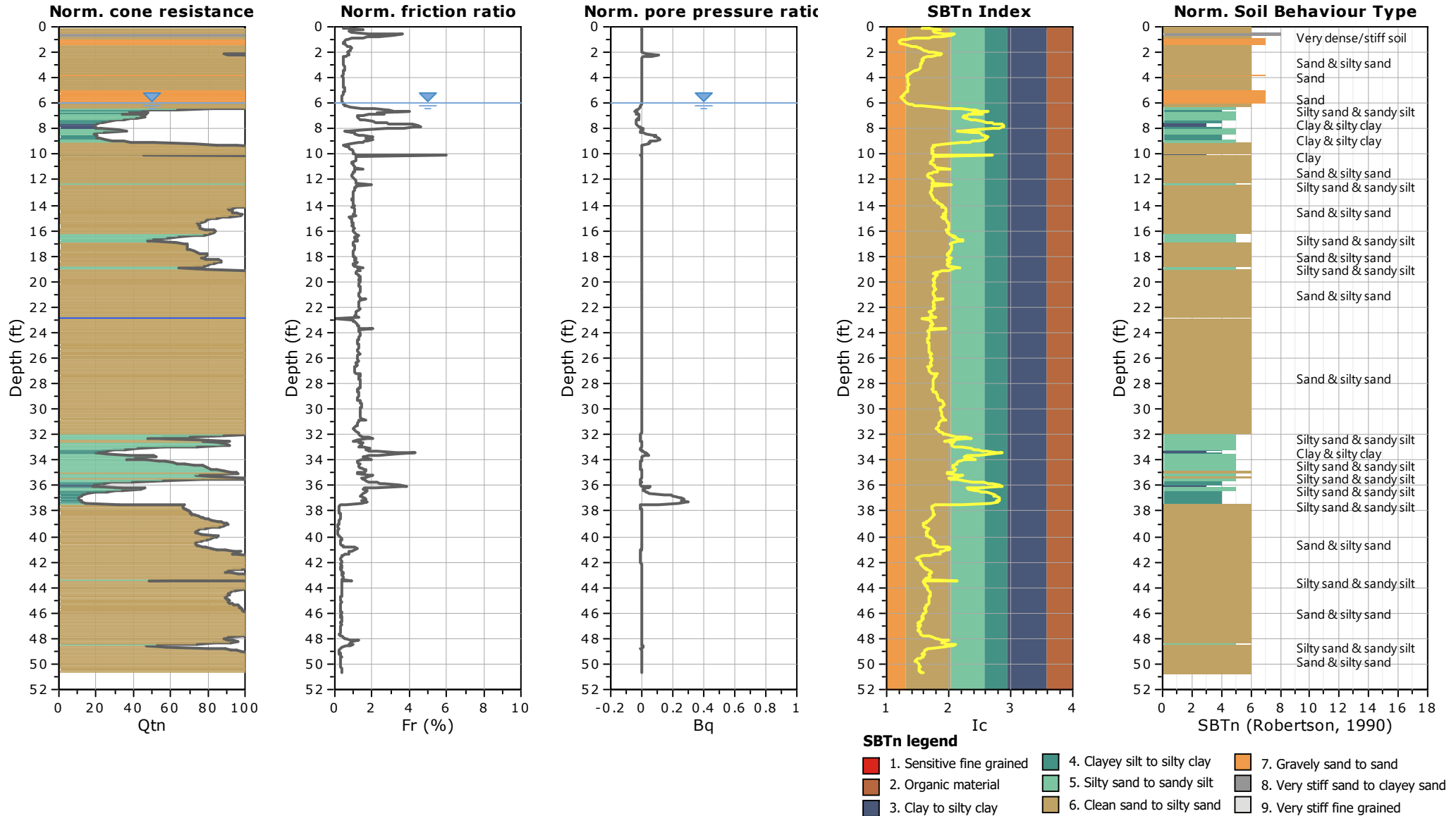
Fuzzy classification legend

- Highly probable clayey soil
- Highly probable mixture soil
- Highly probable sandy soil



Project: Riddle Farm Waste Water Treatment Plant

Location: Berlin, Maryland



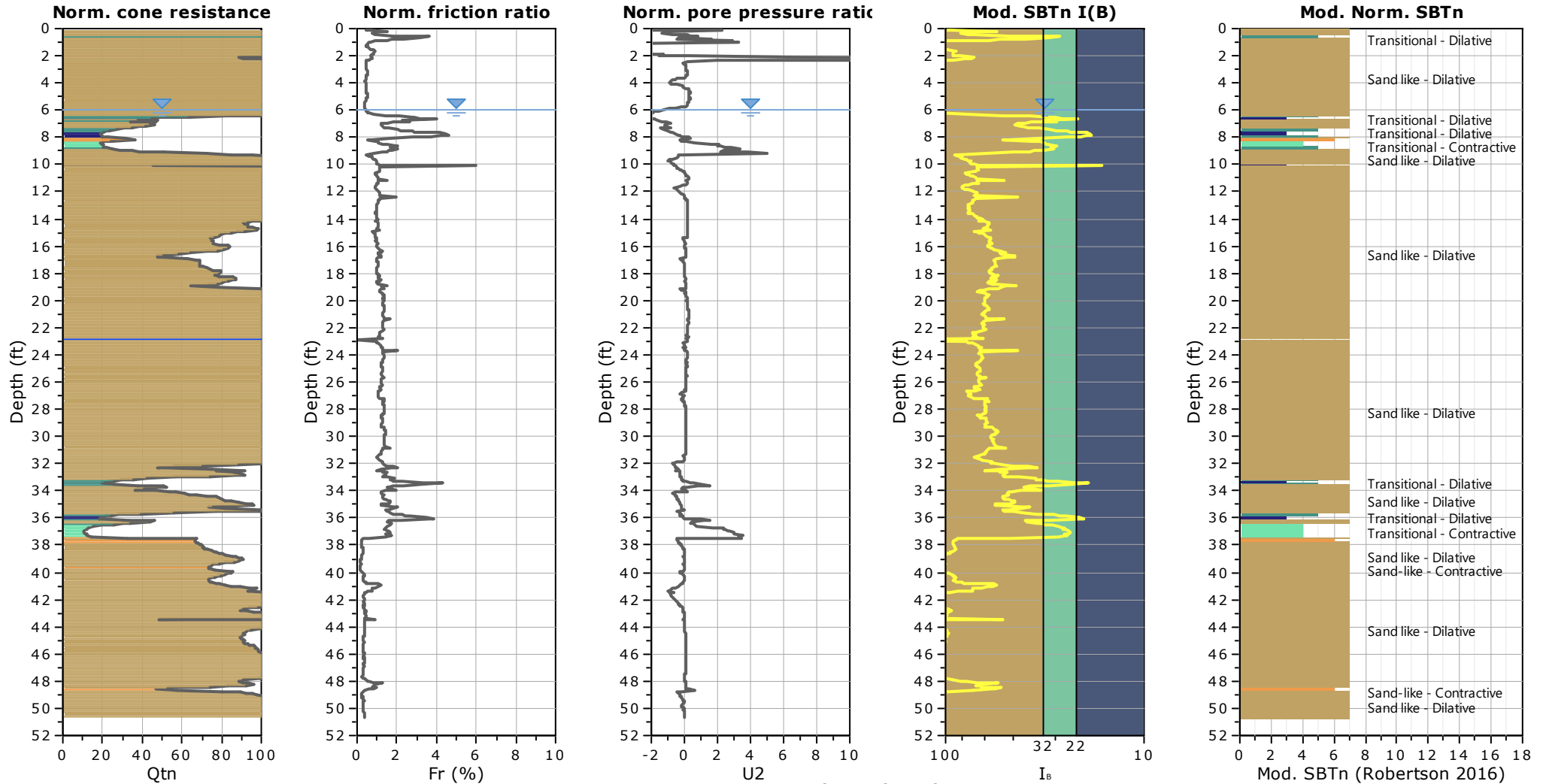
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00320 - 33



Project: Riddle Farm Waste Water Treatment Plant

Location: Berlin, Maryland



Mod. SBTn legend

- 1. CCS: ClayLike - Contractive, Sensitive
- 2. CC: Clay-like - Contractive
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- 6. SC: Sand-like - Contractive
- 7. SD: Sand-like - Dilative

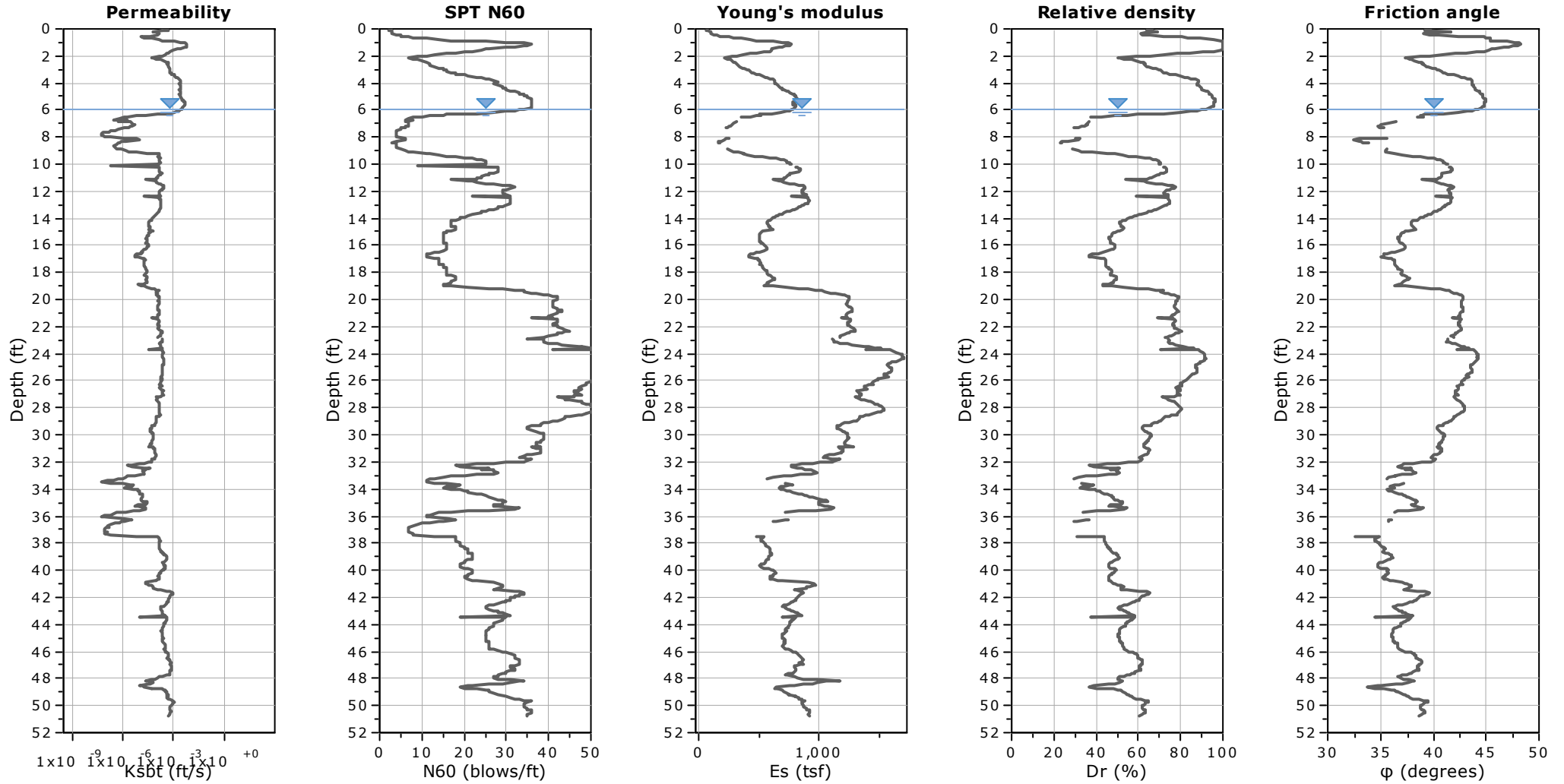
220047

00320 - 34



Project: Riddle Farm Waste Water Treatment Plant

Location: Berlin, Maryland



Calculation parameters

Permeability: Based on SBT_n

SPT N_{60} : Based on I_c and q_t

Young's modulus: Based on variable alpha using I_c (Robertson, 2009)

Relative density constant, C_{Dr} : 350.0

Phi: Based on Kulhawy & Mayne (1990)

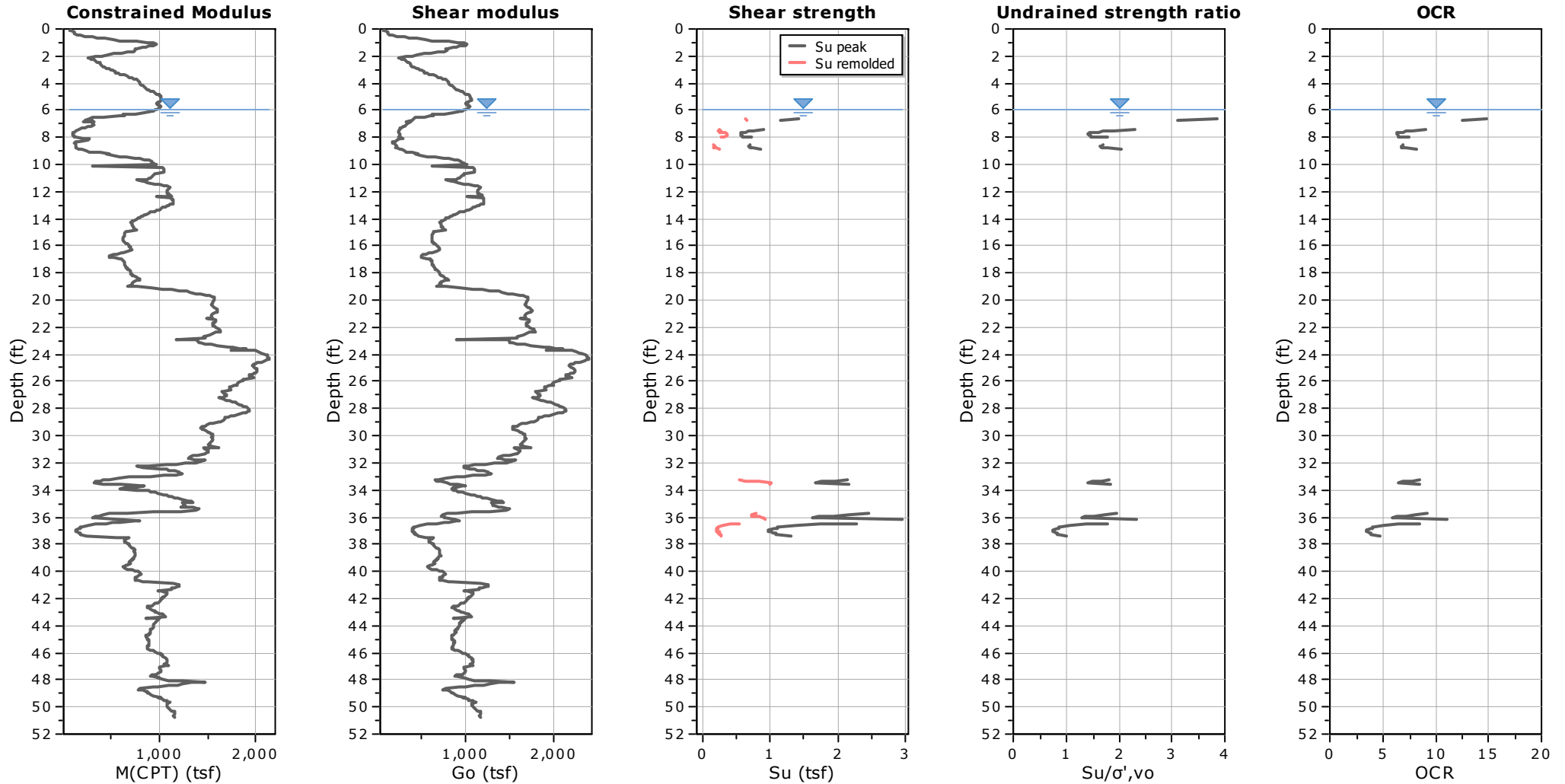
220047

00320 - 35



Project: Riddle Farm Waste Water Treatment Plant

Location: Berlin, Maryland



Calculation parameters

Constrained modulus: Based on variable α using I_c and Q_m (Robertson, 2009)

Go: Based on variable α using I_c (Robertson, 2009)

Undrained shear strength cone factor for clays, N_{kt} : 14

OCR factor for clays, N_{kt} : 0.33

● Flat Dilatometer Test data

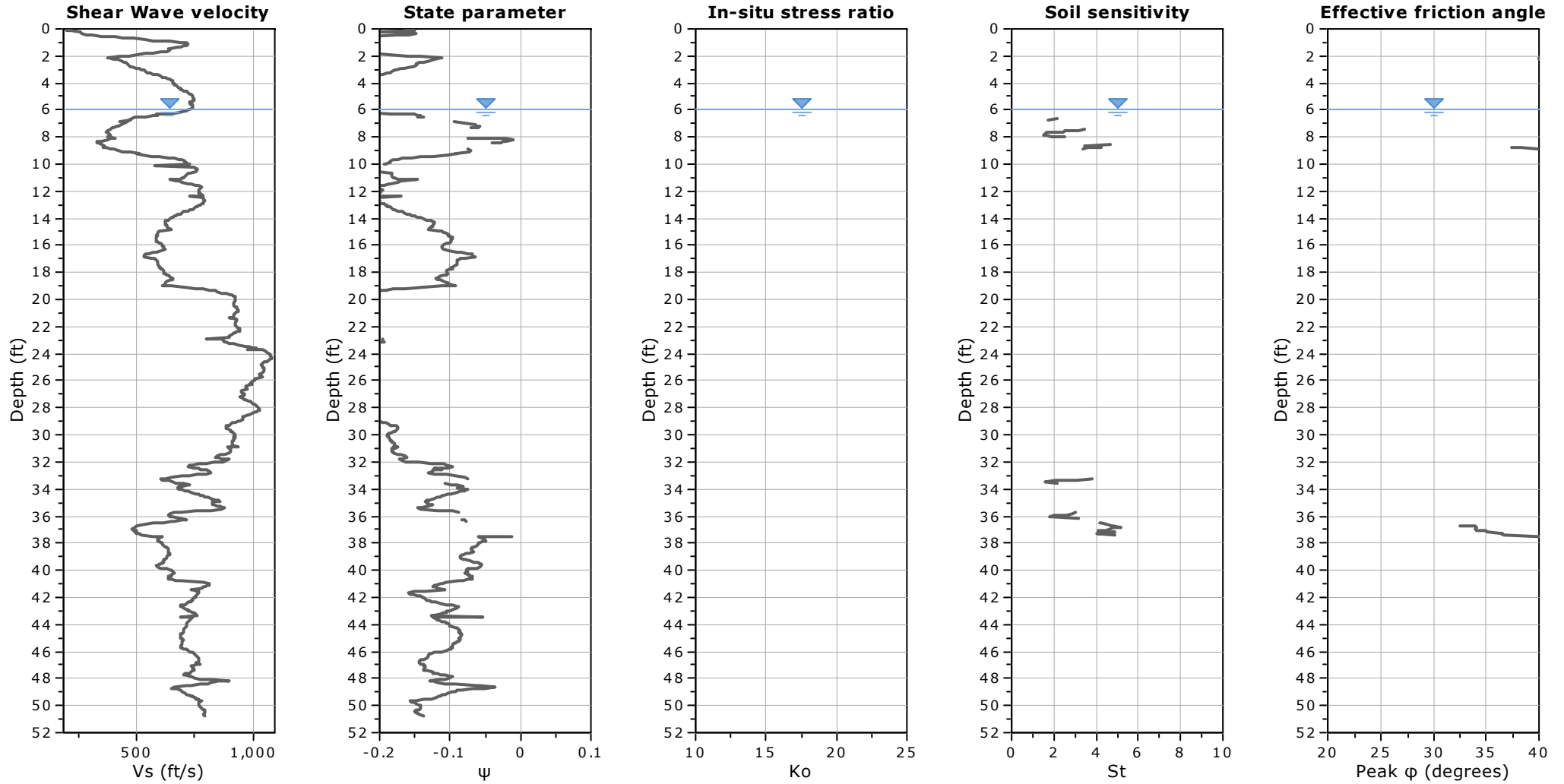
220047

00320 - 36



Project: Riddle Farm Waste Water Treatment Plant

Location: Berlin, Maryland



Calculation parameters

Soil Sensitivity factor, N_s : 7.00

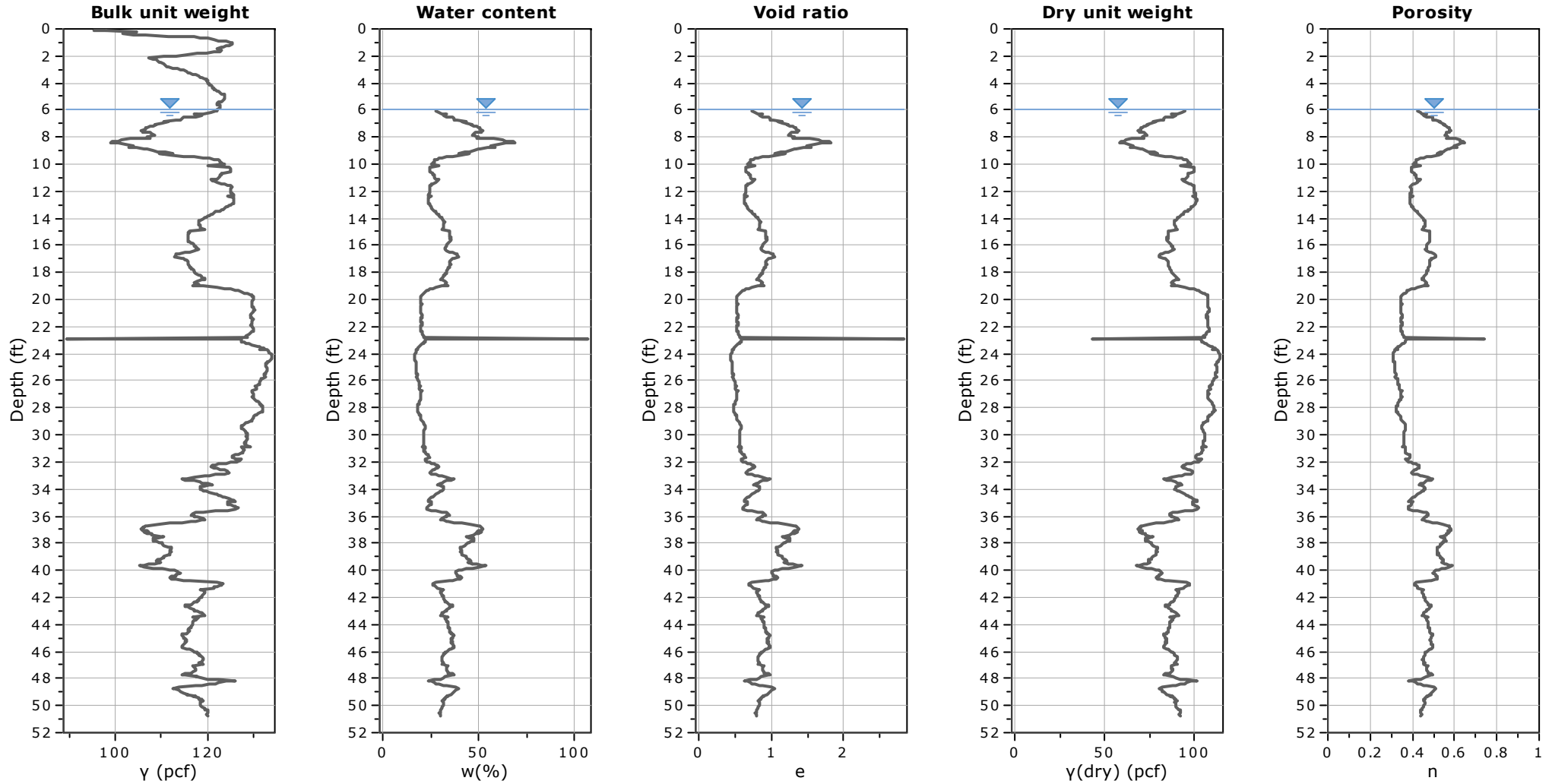
220047

00320 - 37



Project: Riddle Farm Waste Water Treatment Plant

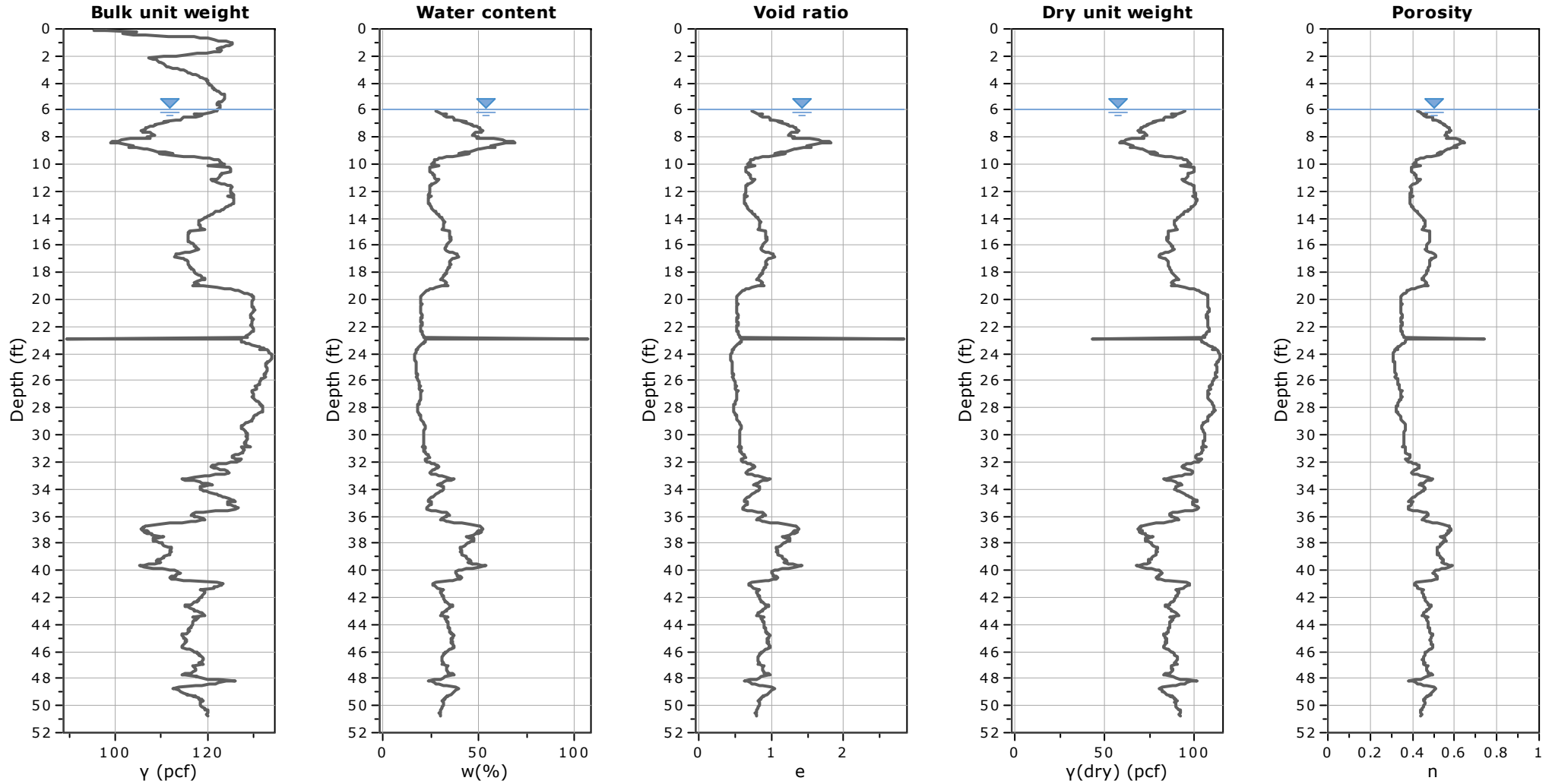
Location: Berlin, Maryland





Project: Riddle Farm Waste Water Treatment Plant

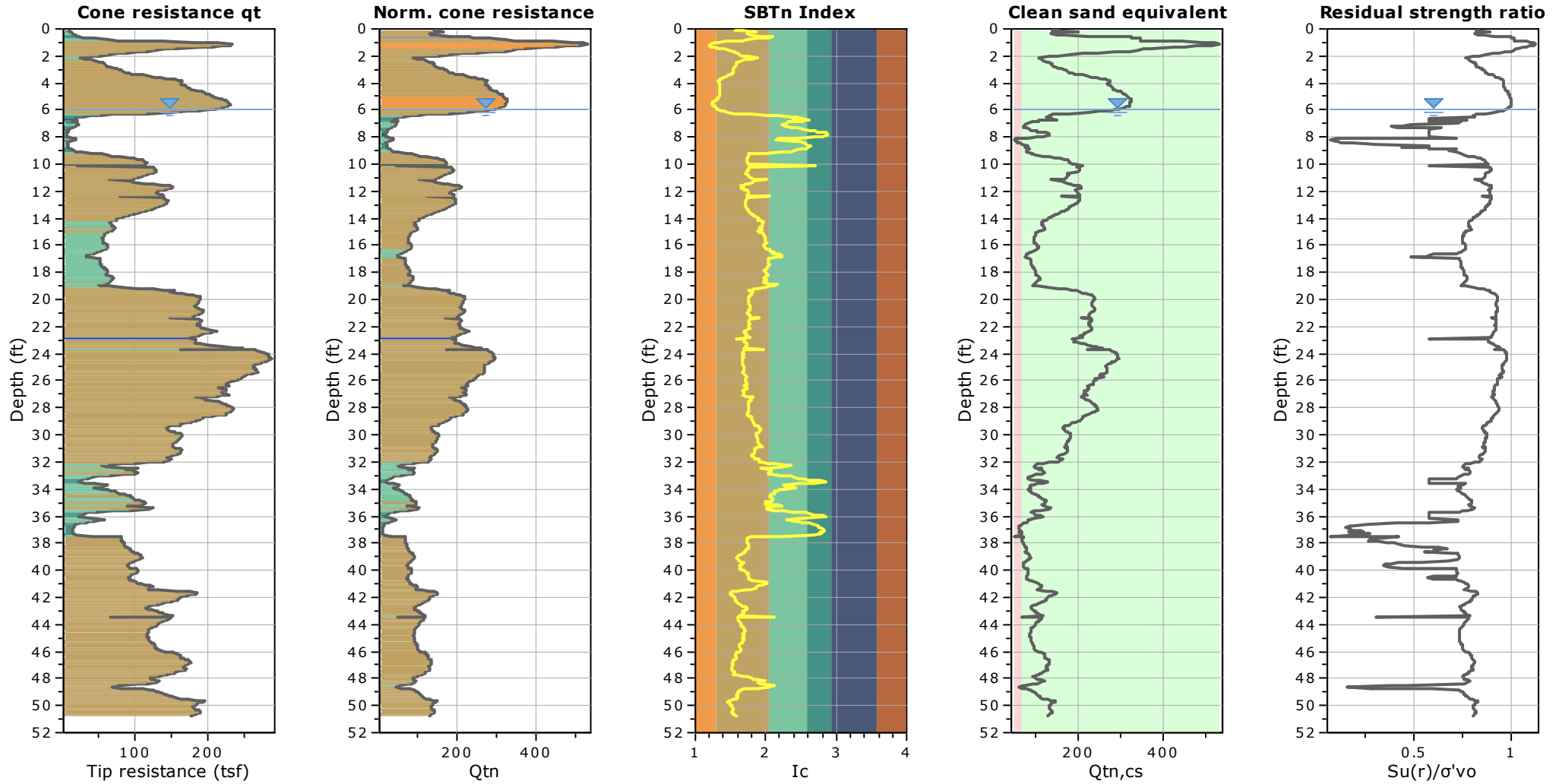
Location: Berlin, Maryland





Project: Riddle Farm Waste Water Treatment Plant

Location: Berlin, Maryland



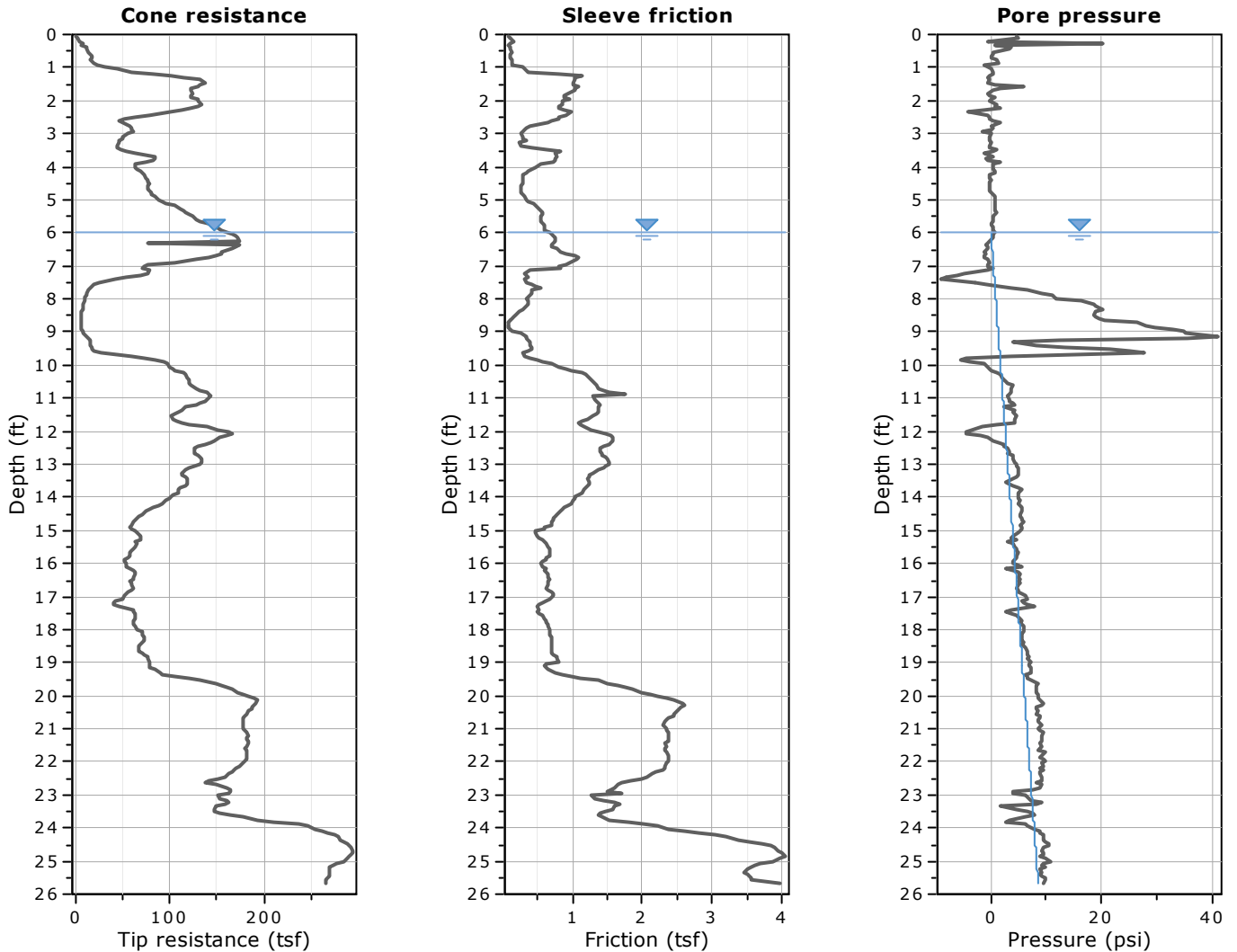
220047

00320 - 40



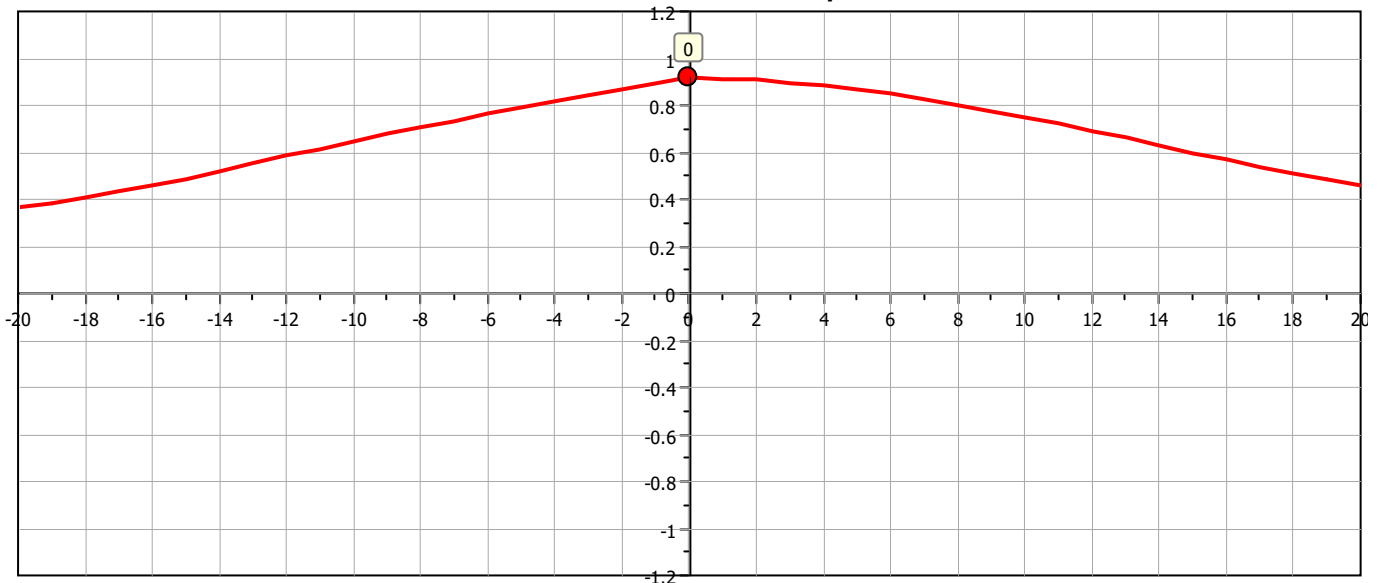
Project: Riddle Farm Waste Water Treatment Plant

Location: Berlin, Maryland



The plot below presents the cross correlation coefficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two successive CPT measurements).

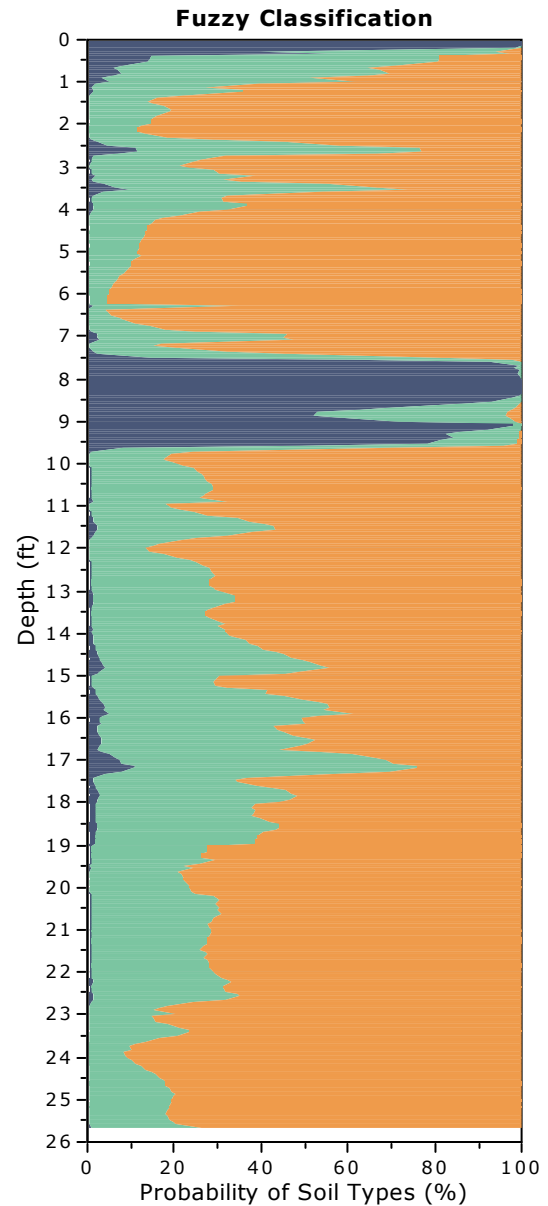
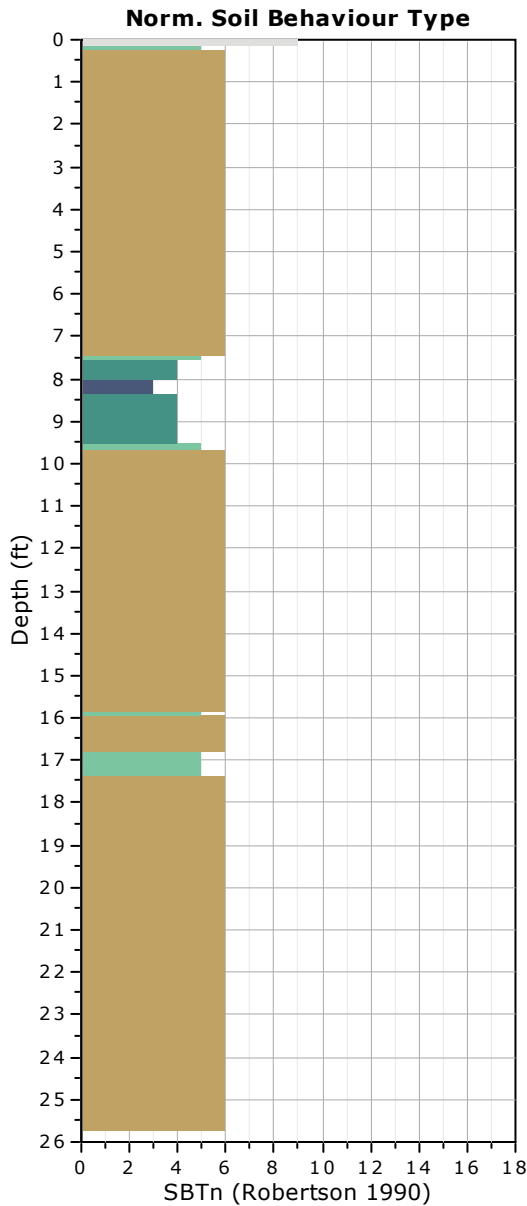
Cross correlation between qc & fs





Project: Riddle Farm Waste Water Treatment Plant

Location: Berlin, Maryland



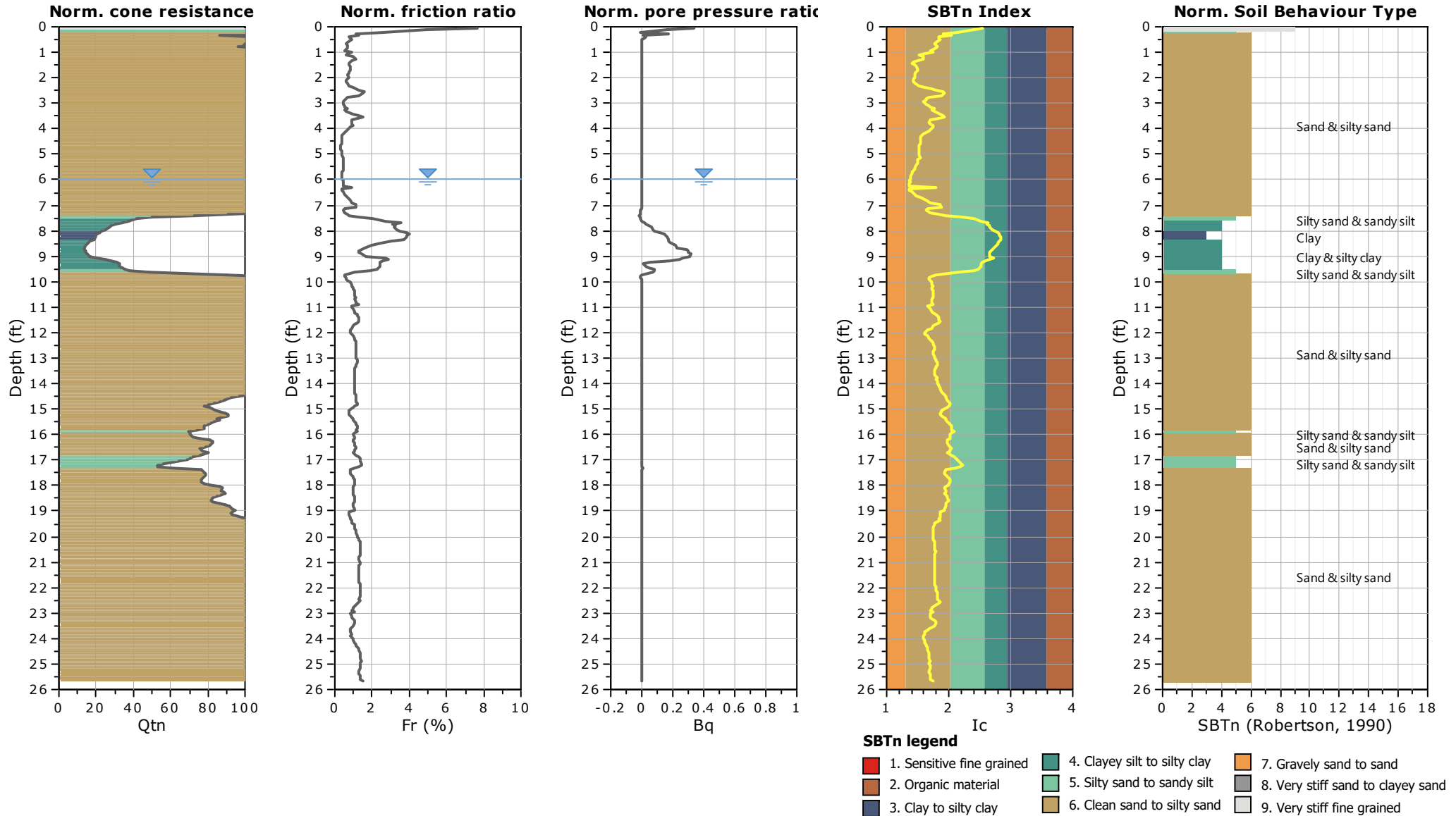
Fuzzy classification legend

- Highly probable clayey soil
- Highly probable mixture soil
- Highly probable sandy soil



Project: Riddle Farm Waste Water Treatment Plant

Location: Berlin, Maryland



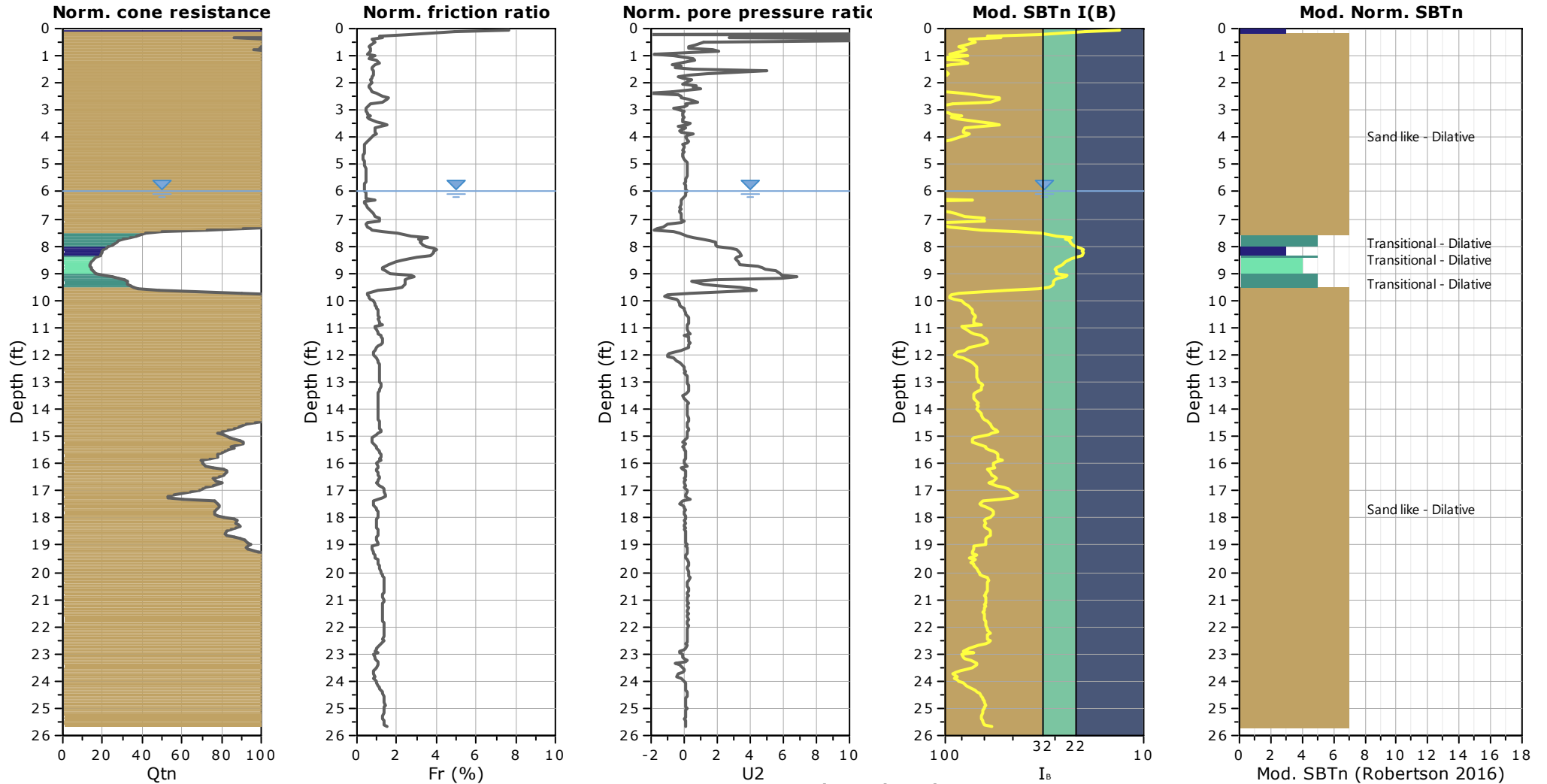
220047

00320 - 43



Project: Riddle Farm Waste Water Treatment Plant

Location: Berlin, Maryland



- Mod. SBTn legend**
- 1. CCS: ClayLike - Contractive, Sensitive
 - 2. CC: Clay-like - Contractive
 - 3. CD: Clay-Like: Dilative
 - 4. TC: Transitional - Contractive
 - 5. TD: Transitional - Dilative
 - 6. SC: Sand-like - Contractive
 - 7. SD: Sand-like - Dilative

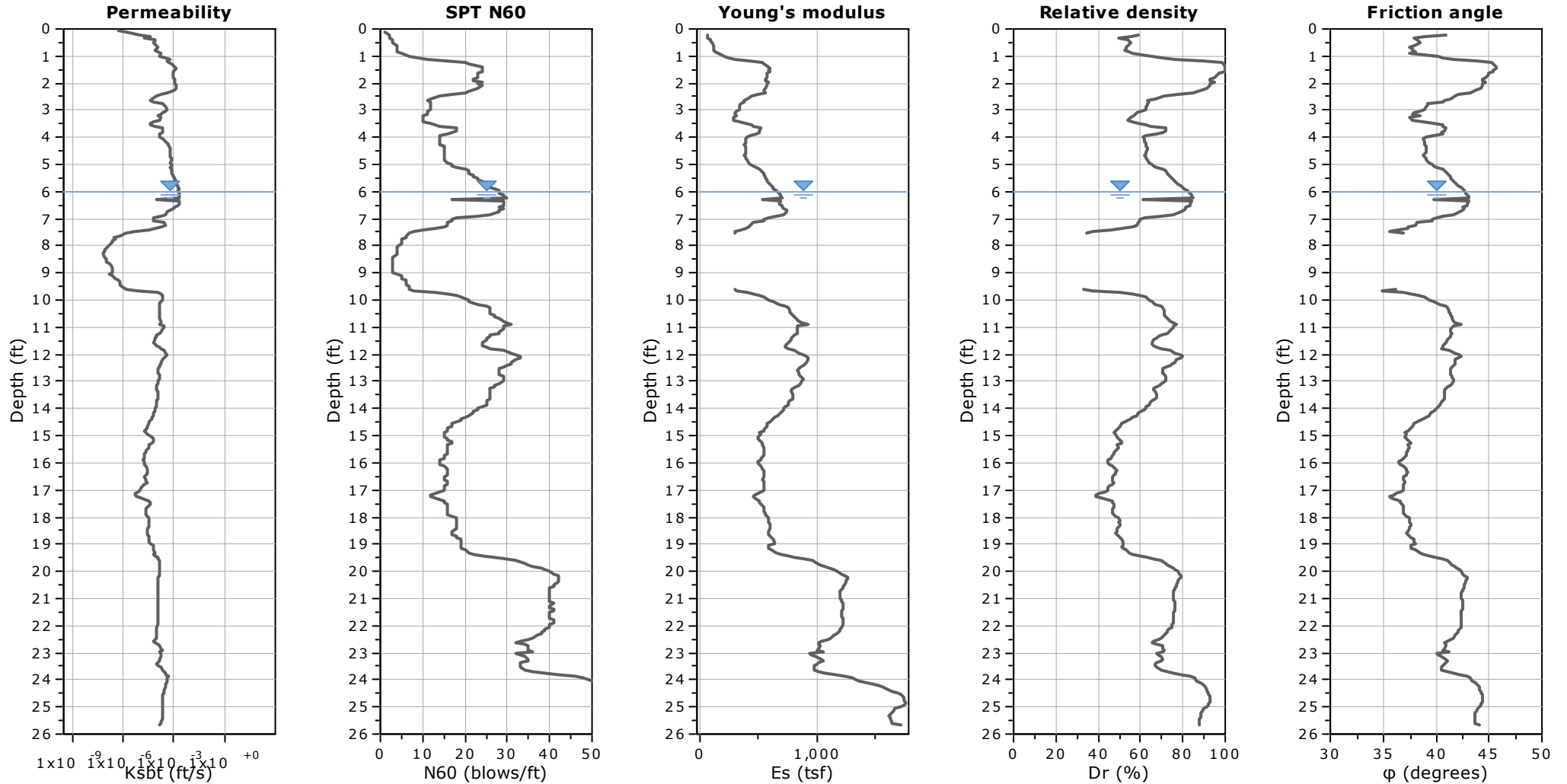
220047

00320 - 44



Project: Riddle Farm Waste Water Treatment Plant

Location: Berlin, Maryland



Calculation parameters

Permeability: Based on SBT_n

SPT N_{60} : Based on I_c and q_t

Young's modulus: Based on variable alpha using I_c (Robertson, 2009)

Relative density constant, C_{Dr} : 350.0

Phi: Based on Kulhawy & Mayne (1990)

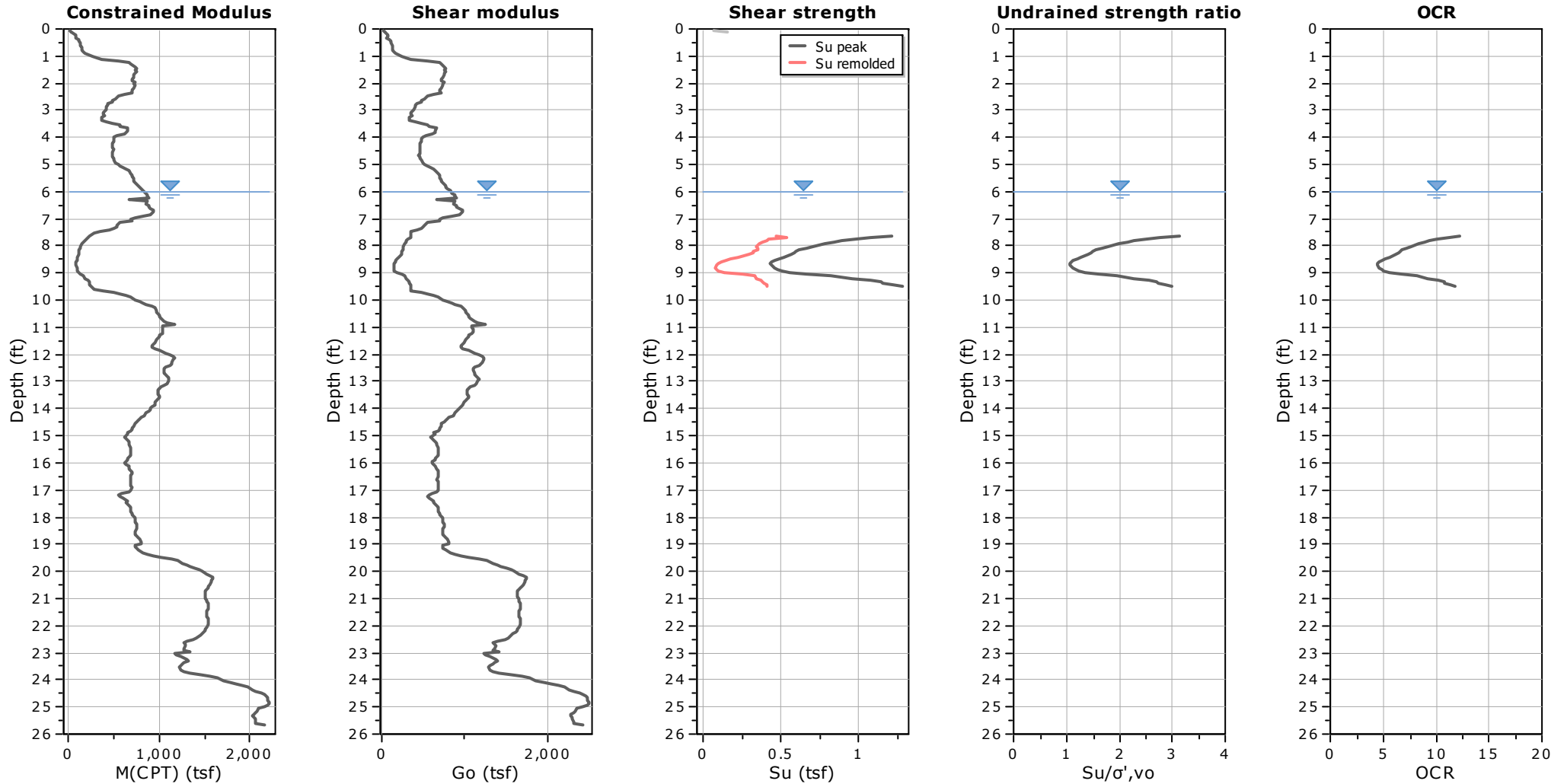
220047

00320 - 45



Project: Riddle Farm Waste Water Treatment Plant

Location: Berlin, Maryland



Calculation parameters

Constrained modulus: Based on variable *alpha* using I_c and Q_m (Robertson, 2009)

Go: Based on variable *alpha* using I_c (Robertson, 2009)

Undrained shear strength cone factor for clays, N_{kt} : 14

OCR factor for clays, N_{kt} : 0.33

● Flat Dilatometer Test data

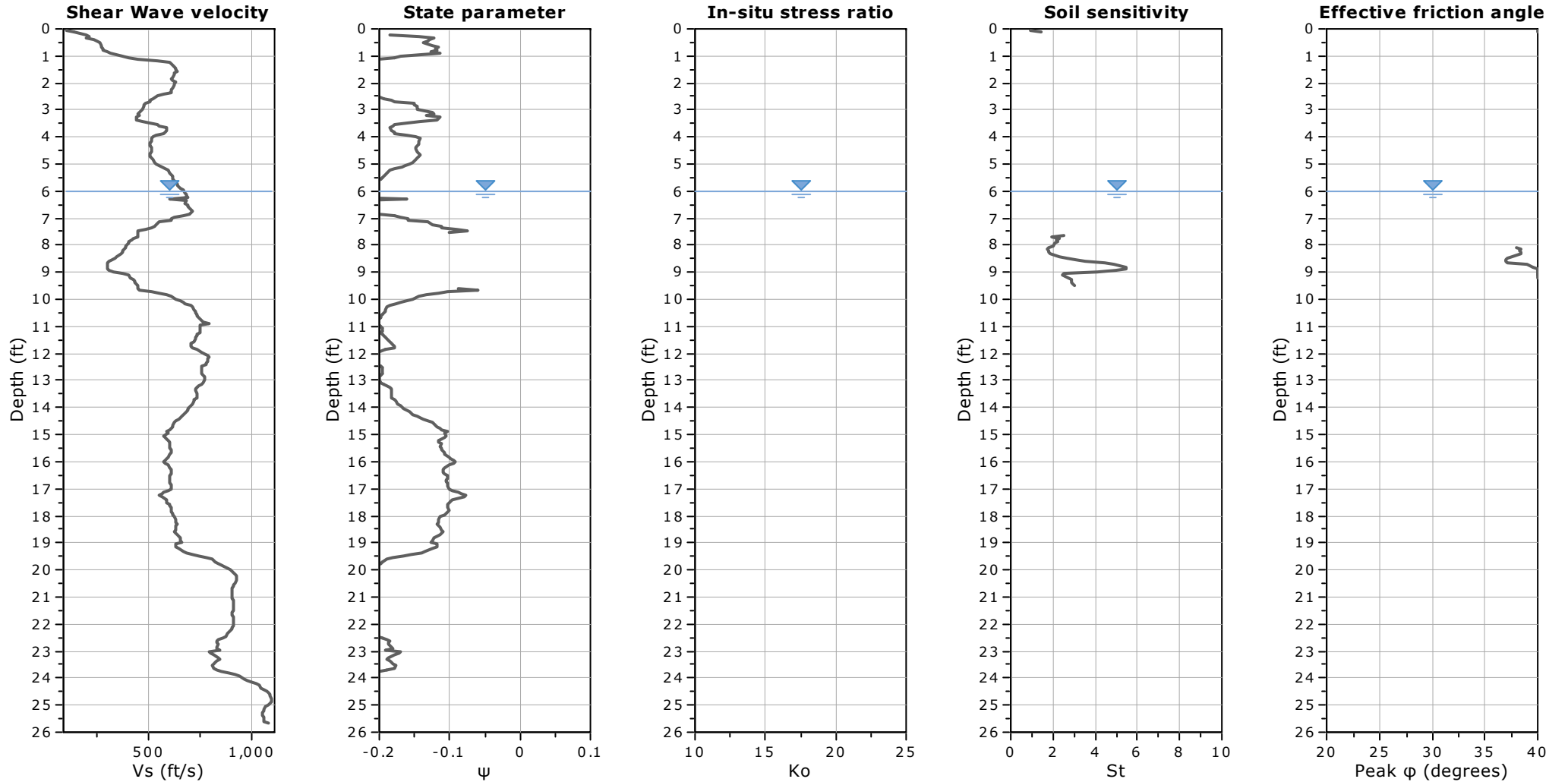
220047

00320 - 46



Project: Riddle Farm Waste Water Treatment Plant

Location: Berlin, Maryland



Calculation parameters

Soil Sensitivity factor, N_s : 7.00

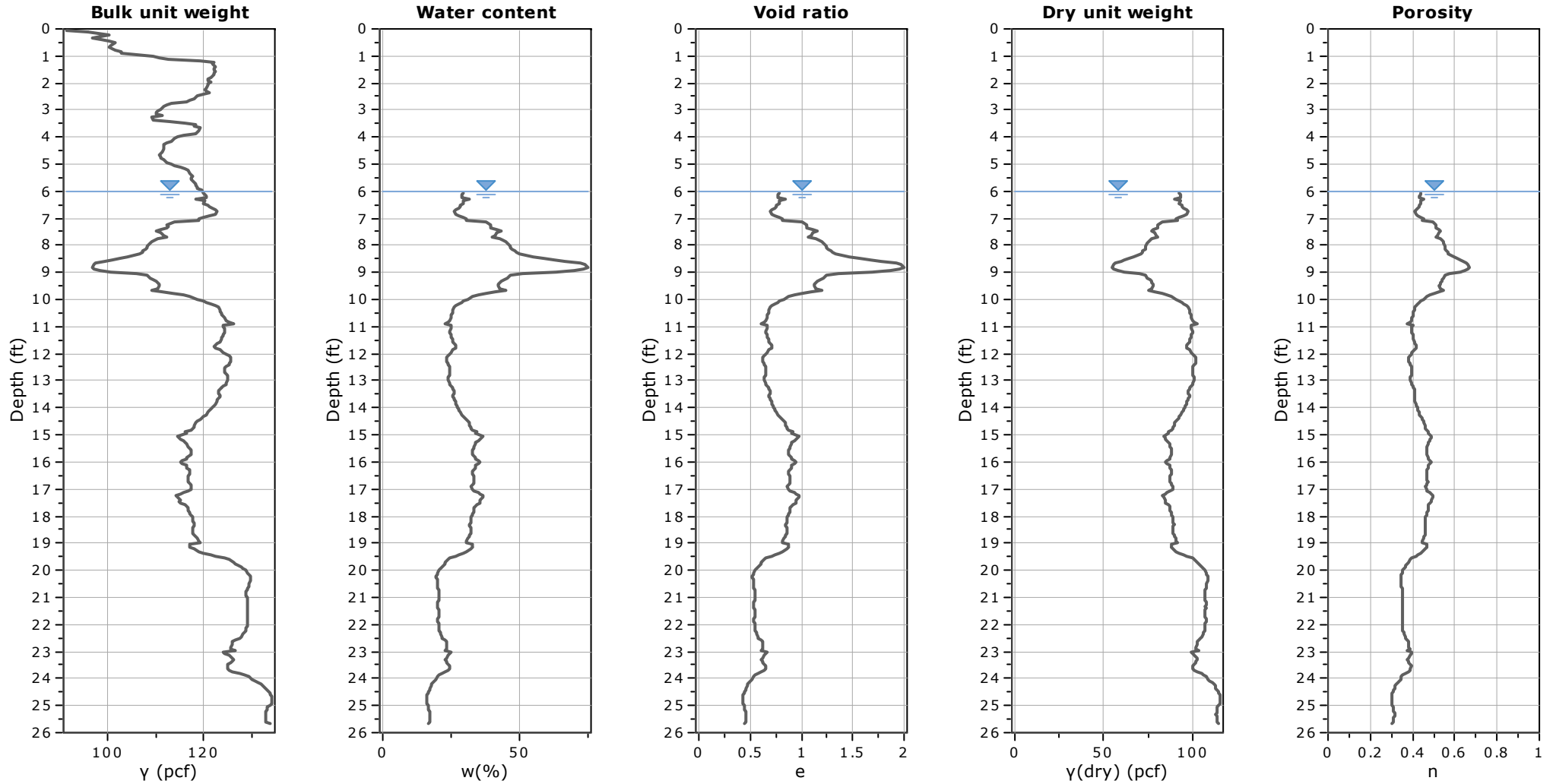
220047

00320 - 47



Project: Riddle Farm Waste Water Treatment Plant

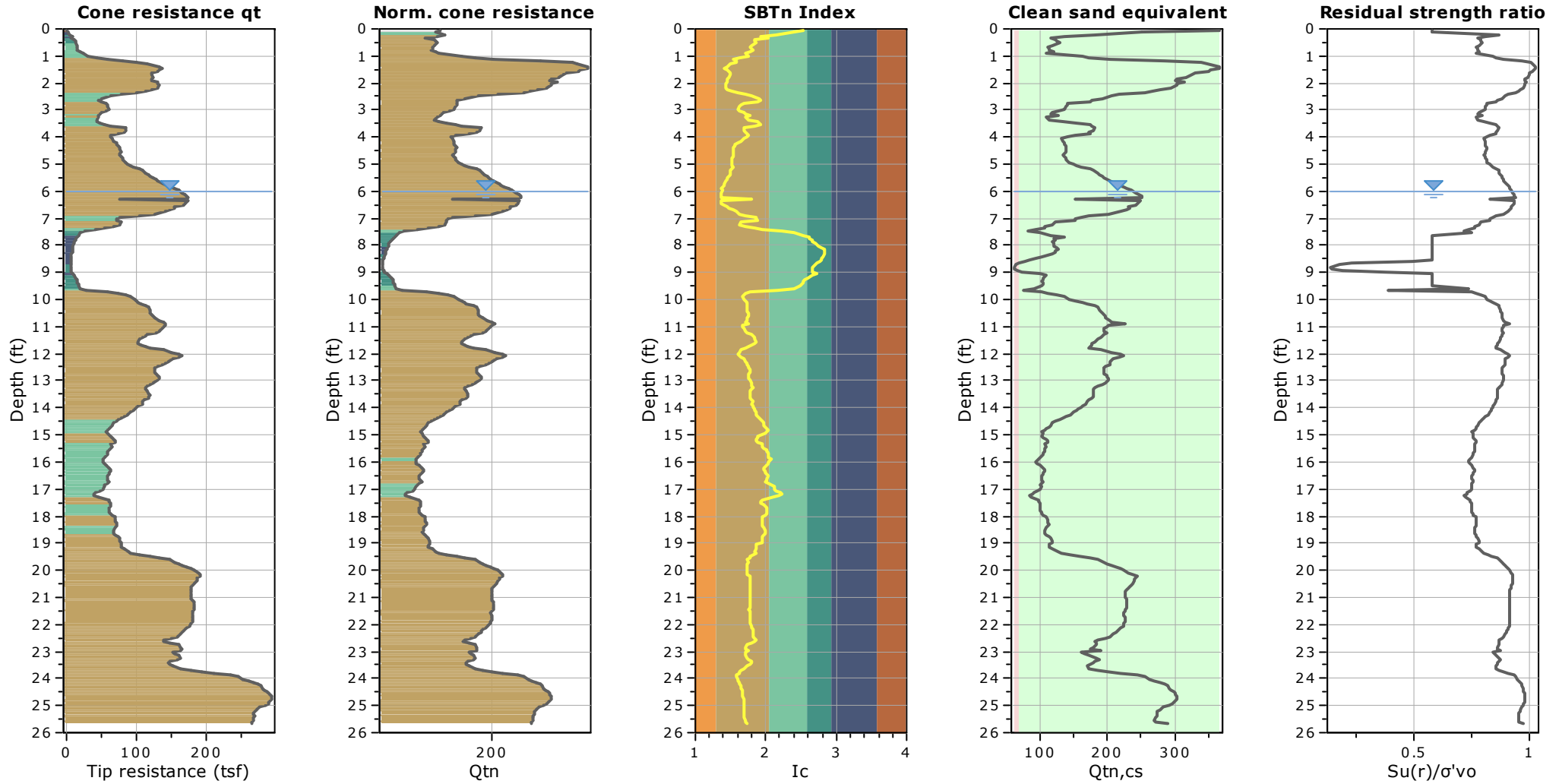
Location: Berlin, Maryland





Project: Riddle Farm Waste Water Treatment Plant

Location: Berlin, Maryland



220047

00320 - 49

Presented below is a list of formulas used for the estimation of various soil properties. The formulas are presented in SI unit system and assume that all components are expressed in the same units.

:: Unit Weight, g (kN/m³) ::

$$g = g_w \cdot \left(0.27 \cdot \log(R_f) + 0.36 \cdot \log\left(\frac{q_t}{p_a}\right) + 1.236 \right)$$

where g_w = water unit weight

:: Permeability, k (m/s) ::

$$I_c < 3.27 \text{ and } I_c > 1.00 \text{ then } k = 10^{0.952-3.04 \cdot I_c}$$

$$I_c \leq 4.00 \text{ and } I_c > 3.27 \text{ then } k = 10^{-4.52-1.37 \cdot I_c}$$

:: N_{SPT} (blows per 30 cm) ::

$$N_{60} = \left(\frac{q_c}{p_a}\right) \cdot \frac{1}{10^{1.1268-0.2817 \cdot I_c}}$$

$$N_{1(60)} = Q_{tn} \cdot \frac{1}{10^{1.1268-0.2817 \cdot I_c}}$$

:: Young's Modulus, E_s (MPa) ::

$$(q_t - \sigma_v) \cdot 0.015 \cdot 10^{0.55 \cdot I_c + 1.68}$$

(applicable only to $I_c < I_{c_cutoff}$)

:: Relative Density, Dr (%) ::

$$100 \cdot \sqrt{\frac{Q_{tn}}{k_{DR}}} \quad \text{(applicable only to SBT}_n\text{: 5, 6, 7 and 8 or } I_c < I_{c_cutoff}\text{)}$$

:: State Parameter, ψ ::

$$\psi = 0.56 - 0.33 \cdot \log(Q_{tn,cs})$$

:: Drained Friction Angle, ϕ (°) ::

$$\phi = \phi'_{cv} + 15.94 \cdot \log(Q_{tn,cs}) - 26.88$$

(applicable only to SBT_n: 5, 6, 7 and 8 or $I_c < I_{c_cutoff}$)

:: 1-D constrained modulus, M (MPa) ::

If $I_c > 2.20$

$\alpha = 14$ for $Q_{tn} > 14$

$\alpha = Q_{tn}$ for $Q_{tn} \leq 14$

$M_{CPT} = \alpha \cdot (q_t - \sigma_v)$

If $I_c \geq 2.20$

$$M_{CPT} = 0.03 \cdot (q_t - \sigma_v) \cdot 10^{0.55 \cdot I_c + 1.68}$$

:: Small strain shear Modulus, G_0 (MPa) ::

$$G_0 = (q_t - \sigma_v) \cdot 0.0188 \cdot 10^{0.55 \cdot I_c + 1.68}$$

:: Shear Wave Velocity, V_s (m/s) ::

$$V_s = \left(\frac{G_0}{\rho}\right)^{0.50}$$

:: Undrained peak shear strength, S_u (kPa) ::

$$N_{kt} = 10.50 + 7 \cdot \log(F_r) \text{ or user defined}$$

$$S_u = \frac{(q_t - \sigma_v)}{N_{kt}}$$

(applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c_cutoff}$)

:: Remolded undrained shear strength, $S_u(rem)$ (kPa) ::

$$S_{u(rem)} = f_s \quad \text{(applicable only to SBT}_n\text{: 1, 2, 3, 4 and 9 or } I_c > I_{c_cutoff}\text{)}$$

:: Overconsolidation Ratio, OCR ::

$$k_{OCR} = \left[\frac{Q_{tn}^{0.20}}{0.25 \cdot (10.50 + 7 \cdot \log(F_r))} \right]^{1.25} \text{ or user defined}$$

$$OCR = k_{OCR} \cdot Q_{tn}$$

(applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c_cutoff}$)

:: In situ Stress Ratio, K_0 ::

$$K_0 = (1 - \sin \phi') \cdot OCR^{\sin \phi'}$$

(applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c_cutoff}$)

:: Soil Sensitivity, S_t ::

$$S_t = \frac{N_s}{F_r}$$

(applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c_cutoff}$)

:: Peak Friction Angle, ϕ' (°) ::

$$\phi' = 29.5^\circ \cdot B_q^{0.121} \cdot (0.256 + 0.336 \cdot B_q + \log Q_t)$$

(applicable for $0.10 < B_q < 1.00$)

References

- Robertson, P.K., Cabal K.L., Guide to Cone Penetration Testing for Geotechnical Engineering, Gregg Drilling & Testing, Inc., 5th Edition, November 2012
- Robertson, P.K., Interpretation of Cone Penetration Tests - a unified approach., Can. Geotech. J. 46(11): 1337–1355 (2009)
- N Barounis, J Philpot, Estimation of in-situ water content, void ratio, dry unit weight and porosity using CPT for saturated sands, Proc. 20th NZGS Geotechnical Symposium

Terms & Conditions

Visual and numerical data provided by Stable Ground In-Situ, LLC is to be used at the client's discretion. Raw data (Depth, qc, fs, u2) is provided for separate characteristic and parameter verifications.



Seismic Design Criteria

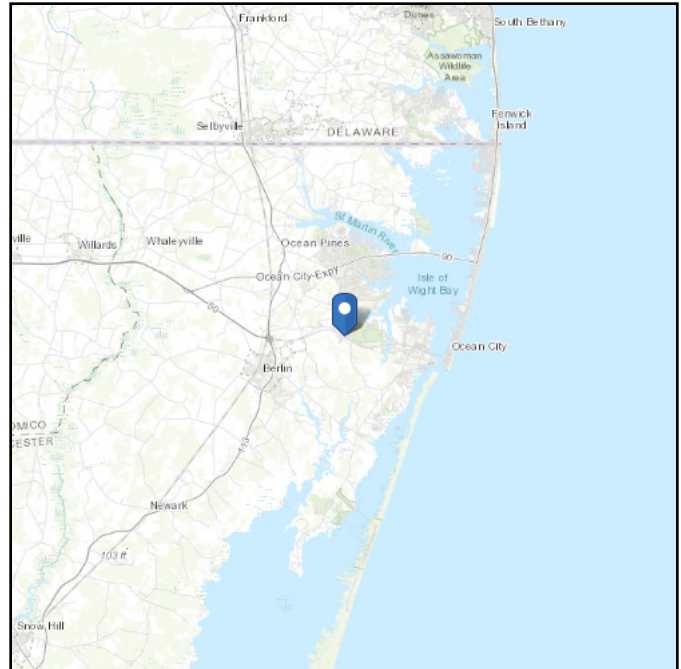
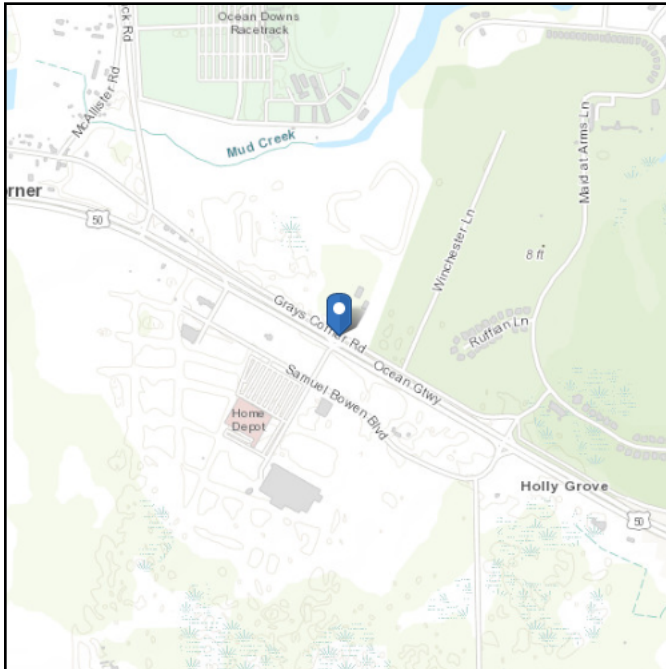
ASCE Hazards Report



Address:
11350 Grays Corner Rd
Berlin, Maryland
21811

Standard: ASCE/SEI 7-22
Risk Category: III
Soil Class: D - Stiff Soil

Latitude: 38.343631
Longitude: -75.160983
Elevation: 9.30223594727784 ft (NAVD 88)

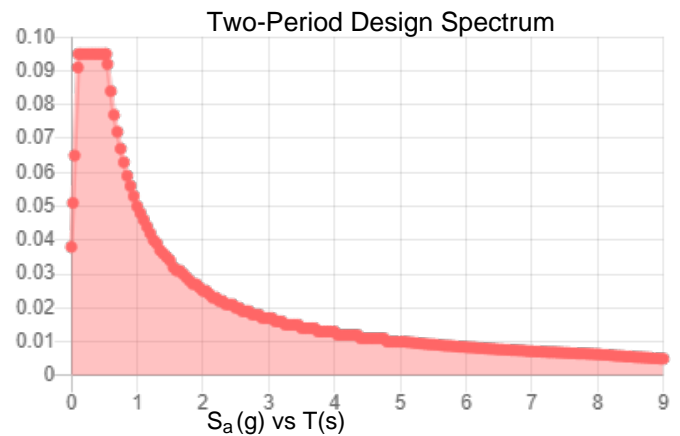
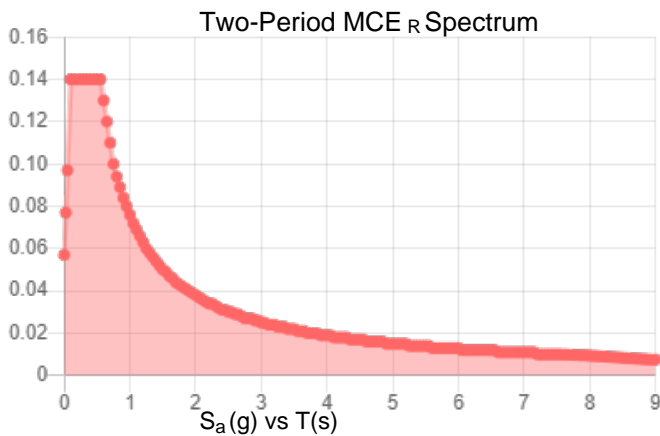
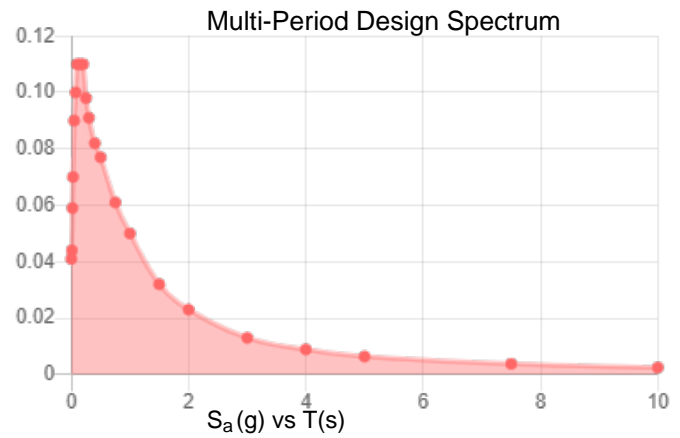
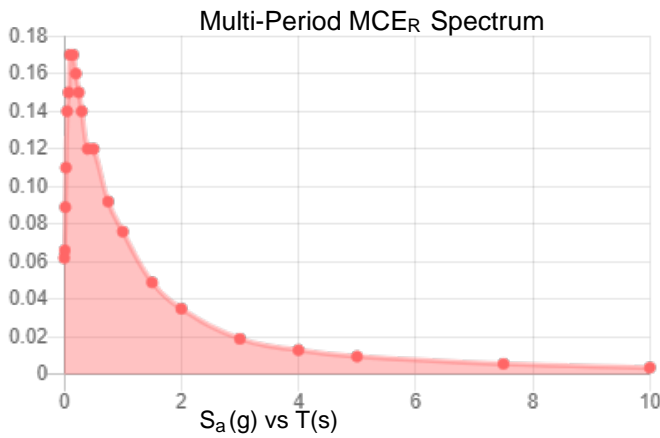


Site Soil Class: D - Stiff Soil

Results:

PGA _M :	0.055	T _L :	8
S _{MS} :	0.14	S _s :	0.11
S _{M1} :	0.076	S ₁ :	0.035
S _{DS} :	0.095	V _{S30} :	260
S _{D1} :	0.05		

Seismic Design Category: A



MCE_R Vertical Response Spectrum

Vertical ground motion data has not yet been made available by USGS.

Design Vertical Response Spectrum

Vertical ground motion data has not yet been made available by USGS.

Data Accessed: Thu Feb 01 2024

Date Source:

USGS Seismic Design Maps based on ASCE/SEI 7-22 and ASCE/SEI 7-22 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-22 Ch. 21 are available from USGS.

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DIVISION 00 – BIDDING AND CONTRACT REQUIREMENTS

SECTION 00330

PROCUREMENT PURCHASE ORDER

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ZENON ENVIRONMENTAL CORPORATION
 3239 DUNDAS STREET WEST
 OAKVILLE, ON L6M 4B2
 PHONE: 1-866-439-2837
 FAX: 866-891-4893 (ORDER PLACEMENT)

REMIT TO:
 Wire Transfer:
 Bank of America Merrill Lynch
 C/O Zenon Environmental Corporation
 901 Main Street Dallas, TX 75202 ACH# 111000012
 ABA# 026009593, SWIFT# BOFAUS3N, ACCT# 4426318136

Zenon Environmental Corporation
 14506 Collection Center Drive
 Chicago, IL 60693
 Send details to: vtc.vwts.remit-nam.all@veolia.com

MILESTONE INVOICE

902172677

100027195

INVOICE DATE	SHIPMENT TRACKING ID	CUSTOMER PO NO.
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JUN/13/2023		160-22120
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MAIL TO: 476958 WORCESTER CO. WATER & WASTEWATER ATTN : ACCOUNTS PAYABLE 1000 SHORE LANE BERLIN MD 21811 UNITED STATES	SHIP TO: 4000147940 WORCESTER CO. WATER & WASTEWATER 1000 SHORE LANE BERLIN MD 21811 UNITED STATES Tax Identification Number: 52-6601064
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BILL TO: 476958 VAT No: WORCESTER CO. WATER & WASTEWATER ATTN : ACCOUNTS PAYABLE 1000 SHORE LANE BERLIN MD 21811 UNITED STATES	PAYMENT TERMS: Net 30 Days from Date of Receipt of Invoice	DUE DATE 20JUL2023
TERMS OF DELIVERY: DDP - POINT OF DESTINATION		

SALES REP NO./NAME	ORDERED BY	PAYER	SALES ORDER
91006125 - MATT STAPLEFORD		161791	7546275

CARRIER:	SHIPPED FROM:
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DELIVERY NO.:	FREIGHT: PREPAID
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DESTINATION COUNTRY: UNITED STATES	CURRENCY: U.S. Dollar
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SI No #	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	UNIT	AMOUNT
THESE COMMODITIES, TECHNOLOGY OR SOFTWARE WERE EXPORTED FROM THE UNITED STATES IN ACCORDANCE WITH THE EXPORT ADMINISTRATION REGULATIONS. DIVERSION CONTRARY TO U.S. LAW PROHIBITED. NOTWITHSTANDING THE INCO TERMS STATED ABOVE, TITLE SHALL TRANSFER TO THE BUYER AT TIME OF SHIPMENT FROM SELLERS PLANT. CERTIFIED TRUE, JUST AND CORRECT						
10	3178088-M/C-ZW500D,RX12,16/12,316L,LEAP,2X4 Origin Tariff Code: 8421210000 ECCN Code: EAR99	6.00	EA			
20	3095534-FEE,FREIGHT/INSURANCE ECCN Code: NOTAPART	1.00	EA			
30	3095534-FEE,FREIGHT/INSURANCE ECCN Code: NOTAPART	1.00	EA			
50	3111838-RING,HOIST,SWIVEL,AK47128 Origin Tariff Code: 7326908688 ECCN Code: EAR99	4.00	EA			
60	3040549-TOOL,ZW500D,HEADER REMOVAL,4100175 Origin Tariff Code: 8205595560	1.00	EA			



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 4426318136

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 14506 Collection Center Drive
 Chicago, IL 60693
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DESTINATION COUNTRY: UNITED STATES	CURRENCY: U.S. Dollar
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130	3074649-HOSE,3.00,AIR,CONTINENTAL,PLICORD,300	100.00	FT			



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JUN/13/2023				160-22120	
MAIL TO: 476958			SHIP TO: 4000147940		
WORCESTER CO. WATER & WASTEWATER ATTN : ACCOUNTS PAYABLE 1000 SHORE LANE BERLIN MD 21811 UNITED STATES			WORCESTER CO. WATER & WASTEWATER 1000 SHORE LANE BERLIN MD 21811 UNITED STATES Tax Identification Number: 52-6601064		
BILL TO: 476958		PAYMENT TERMS:		DUE DATE	
VAT No: WORCESTER CO. WATER & WASTEWATER ATTN : ACCOUNTS PAYABLE 1000 SHORE LANE BERLIN MD 21811 UNITED STATES		Net 30 Days from Date of Receipt of Invoice		20JUL2023	
		TERMS OF DELIVERY:			
		DDP - POINT OF DESTINATION			
SALES REP NO./NAME	ORDERED BY	PAYER	SALES ORDER		
91006125 - MATT STAPLEFORD		161791	7546275		
CARRIER:		SHIPPED FROM:			
DELIVERY NO.:		FREIGHT: PREPAID			
DESTINATION COUNTRY: UNITED STATES		CURRENCY: U.S. Dollar			
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190	3073373-COUPLING-CMLCK,316,FCXHSB,3.00,C,ON	18.00	EA		
	Origin Tariff Code: 7307221000 ECCN Code: 2B999G				



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JUN/13/2023		160-22120

MAIL TO: 476958 WORCESTER CO. WATER & WASTEWATER ATTN : ACCOUNTS PAYABLE 1000 SHORE LANE BERLIN MD 21811 UNITED STATES	SHIP TO: 4000147940 WORCESTER CO. WATER & WASTEWATER 1000 SHORE LANE BERLIN MD 21811 UNITED STATES Tax Identification Number: 52-6601064
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TERMS OF DELIVERY: DDP - POINT OF DESTINATION		

SALES REP NO./NAME	ORDERED BY	PAYER	SALES ORDER
91006125 - MATT STAPLEFORD		161791	7546275

CARRIER:	SHIPPED FROM:
-----------------	----------------------

DELIVERY NO.:	FREIGHT: PREPAID
----------------------	-------------------------

DESTINATION COUNTRY: UNITED STATES	CURRENCY: U.S. Dollar
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SI No #	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	UNIT	AMOUNT
	IF PAID AFTER 20JUL2023 PLEASE REMIT USD 130,539.60 Please pay invoice on time to avoid any interruption of service.					

For payment by check, please mention invoice no 902172677 on payment and send by courier to above mentioned remit to address.	NET PRICE	127,980.00
	PAY THIS AMOUNT	127,980.00

Anti Fuel - 7/6/23

WORCESTER COUNTY DEPARTMENT OF PUBLIC WORKS

BILL TO: WATER & WASTEWATER DIVISION
 1000 SHORE LANE
 BERLIN, MARYLAND 21811
 PHONE: 410-641-5251 FAX: 410-641-5185

SHIP TO: WATER & WASTEWATER DIVISION
 1000 SHORE LANE
 BERLIN, MARYLAND 21811

VENDOR Zenon Environmental Corporation
 3239 Dundas Street West
 Oakville, Ontario, Canada L6M 4B2
 Phone: 905-334-4035; Fax: 905-465-3050; email: matthew.stapleford@veolia.com

PART FOR: Attn: Matt Stapleford

DATE:	July 6, 2023	PURCHASE ORDER NUMBER:	160-22120
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QUANTITY	PART NUMBER	DESCRIPTION	AMOUNT	W&WW ID
6	3178088	replacement cassettes, membrane modules & aeration spools & associated hardware (see Base Offer for complete list of) materials, services & pricing)		

TOTAL \$ 440,030.00

Proposal #: 496439-3
 Project #: 600006

site: Riddle Farm WWTP

UNIT	Riddle Farm WWTP	
CODE	APPROVED BY	
100.1801.6160.151	Tony Fascelli, P.E., Superintendent, Water & Wastewater	

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membrane replacement proposal

to:	Worcester County Department of Public Works referred to here as Riddle Farms or Buyer	date:	November 28, 2022
		no. of pages:	33 including cover
attention:	Dominic Ross	email:	dross@co.worcester.md.us
plant address:	11401 Gray's Corner Road Berlin, MD 21811	telephone no.:	410 641 5251 x2422
		cell no.:	410 430 7968
		fax no.:	410 641 5297
from:	Matt Stapleford regional lifecycle manager northeast USA	email:	matthew.stapleford@veolia.com
		cell no.:	905 334 4035
cc:			
subject:	membrane replacement: 6 x 12/16M ZW500D LEAP cassettes with 430ft ² modules with an optional adder – controls upgrade	proposal no.:	496439-2
		original project no.:	600006
plant data:	Please provide corrections if inaccurate Glenn Riddle WWTP: municipal wastewater treatment, 2 trains each containing: 1 x 22/22M ZW500C 220ft ² module cassette + 1 x 22/22M ZW500C 250ft ² module cassette		

proposal provisos

This proposal has been issued based on the information provided by the customer and on information currently available to SUEZ Water Technologies & Solutions at the time of proposal issuance. Any changes or discrepancies in site conditions, including but not limited to changes in system influent water characteristics, changes in environmental health and safety (EH&S) conditions, changes in the reissued state/provincial disposal system permit, changes in buyer financial standing, buyer requirements, or any other relevant change or discrepancy in the factual basis upon which this proposal was created may lead to changes in the offering, including but not limited to changes in pricing, guarantees, quoted specifications, or terms and conditions.

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1 introduction

SUEZ Water Technologies & Solutions is pleased to present this proposal at the request of Worcester County Department of Public Works to provide wastewater membrane modules to replace and upgrade the full plant at the Glen Riddle Wastewater Treatment Plant (WWTP).

With this offer SUEZ will provide our most recent ZW500D product, the RX12, with 430ft² of surface area in ZW500D LEAPmbr cassettes. This proposal is limited to the in-tank equipment required to upgrade to the latest ZeeWeed membrane technology.

In addition to the membrane replacement, an optional adder for a controls system upgrade has been included for Riddle Farms' consideration to upgrade the existing obsolete SLC500 system to a CompactLogix system. The adder will include complete replacement & upgrade of the PLC and I/O controls system to CompactLogix including conversion of the existing program and HMI replacement.

Through long-acquired technical experience, SUEZ has clearly distinguished itself from other membrane manufacturers. A mature service culture and deep technical expertise are ready to serve and support Riddle Farms through this next membrane upgrade.

2 SUEZ scope & price

SUEZ's scope includes the material and services outlined in the table below. The sections that follow provide additional detail regarding each scope item.

item description	part #	quantity	price
M/C-ZW500D, RX12,16/12,316L, LEAP, 2X4, section 3.1	3178088	6	
2-year full replacement membrane warranty, section 10		incl.	
cassette permeate & aeration spools		6 sets	
tank drop frame		6	
integrated lifting brackets		6	
membrane guide brackets		12	
ZW500D module removal tool	3040549	1	
ZW500D safety hoist ring for 16M cassettes	3111838	4	
spare cassette hardware:			
- ZW500D element end cap keys	3040447	4	
- blank module header sets	3033393	3	
- #118 EPDM permeate spigot o-rings	3033690	32	
- o-ring lubricant	3089920	2	
- anti-seize lubricant	3158322	1	
off-site support, project management, controls, and documentation section 4.2		incl.	
international shipment, fees, and duties, section 5		incl.	
freight, DDP project site, section 5	3095534	incl.	
material, off-site labor, delivery		sub-total	
on-site support, 1 x FSR on-site for 5x10-hr days plus travel & living, section 4.3	135491	1 visit	
on-site support		sub-total	
All figures are in USD and exclude taxes, which will be applied at the time of invoicing. Please make purchase order to ZENON Environmental Corporation.			total price

optional adder

scope	part #	quantity	price
controls upgrade hardware, section 3.2		lot	
in-house support, controls & drafting, section 4.2	3097215	incl.	
freight, DDP project site	3095534	incl.	
on-site support, plus travel & living, sections 4.1, 4.3	135491	incl.	
All figures are in USD and exclude taxes. Please make purchase order to ZENON Environmental Corporation.			total price

proposal notes:

- ❑ *WTS would like to note that under the current exceptional circumstances across global supply chains and logistics networks, WTS may not be in a position to guarantee and comply with the planned schedule for product / project delivery or performance. WTS reserves the right to modify the schedule / contract accordingly. WTS will promptly inform you of any changes which may impact the contract or the project.*
- ❑ **Price Review.** *Notwithstanding the terms set forth herein or of any agreement or acceptance of Seller's quotation, Seller reserves the right at any time and from time to time by notice in writing to the Buyer to (a) determine periodic price reviews based on Goods' raw material increase arising from currency devaluations (b) increase Prices (or impose temporary price adjustments) based on increases in the cost of base components for the Goods or Services provided, where the increase is due to increased global demand, limited supply, temporary product shortages, allocation of supply, or such other similar inflationary pressures; and (c) impose a surcharge equal to any increase in the cost of the Goods or Services as a result of a modification of exchange rates, duties, taxes or other levies imposed by public authorities.*
- ❑ WTS's proposed price for ZeeWeed membranes is subject to adjustment between the period from the expiry of the proposal validity up to shipment of membranes according to upward changes in the following indices:
 - 40%: PPI Industry Index for Hungary: [LINK to Industry Index](#)
 - 60%: PPI Chemical Industry for European Union: [LINK to EU Chemical PPI](#)

In the event that either index becomes unavailable, a suitable equivalent replacement index will be agreed between the parties. The buyer has the right to request that the supplier supports any price increase with market pricing data, within the bounds of commercial confidentiality.

- ❑ **Shipment/Collection Delays:** *The membrane sale will be subject to price adjustment if not collected within 1 month of Readiness for Shipment. After the one month of Readiness for Shipment if Purchaser does not send his agreement to receive or collects the membrane (depending on Incoterms), Seller is entitled to reallocate the membrane to another customer.*

invoicing schedule	approximate % of sub-total	invoice value, excluding tax	
		base offer	+ adder
An invoice will be issued upon acceptance by SUEZ of customer purchase order. Approximate percent calculation based on the material, off-site labor, delivery sub-total of the purchase order. Shipment of membranes is contingent on receipt of this initial milestone payment.	30%		
An invoice for the balance of the material, off-site labor, delivery sub-total will be issued when membrane module shipping documents are supplied to the carrier.	70%		
A final invoice for the on-site support sub-total will be issued upon completion of installation.	100%		

3 material description

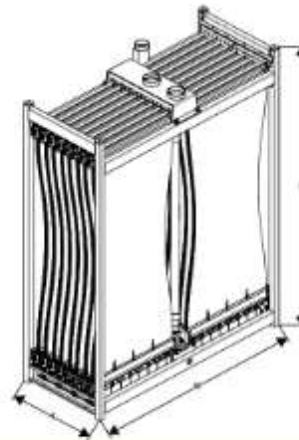
The following materials are provided within SUEZ’s scope of supply.

3.1 membrane modules

72 x ZeeWeed 500D 430ft² wastewater membrane modules factory installed in 6 x ZW500D 12/16M LEAPmbr cassettes. See attachment b for detailed drawing.

ZeeWeed* 500D LEAP Cassette

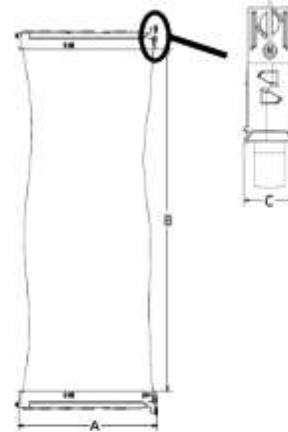
Cassette Dimensions			
Product	Width (A) mm (in)	Length (B) mm (in)	Height (C)
16M	738 (29.1)	1,744 (68.7)	2,512 (98.9)



Cassette Tie-Points & Weights							
Application	Product	Max. # of ZW Modules	Min. # of ZW Modules	Permeate Connection	Air Connection	Max. Shipping Weight ' kg (lb)	Lifting Weight ' kg (lb)
LEAPmbr	16M	16	8	2 x 4" FNPT half couplings	1 x 3" FNPT half coupling	741 [1,634]	777 – 1,455 [1,713 – 3,208]

ZeeWeed* 500D Module

Module Dimensions				
Application	Product	Width (A) mm (in)	Header-to-Header Length (B) mm (in)	Depth (C) mm (in)
MBR	500D	844 [33.2]	1,940 [76.4]	49 [1.9]



Module Properties									
Application	Membrane Surface Area m ² (ft ²)	Max. Shipping Weight ¹ kg (lb)	Lifting Weight ² kg (lb)	Material	Nominal Pore Size (µm)	Fibre Diameter (mm)	Surface Properties	Fibre Tensile Strength (N)	Flow Path
MBR	40.0 [430]	28 [61]	28 - 75 [61 - 164]	PVDF	0.04	2.2	Non-ionic & Hydrophilic	> 600	Outside-in

¹ Packaged

² Varies with solids accumulation

Operating & Cleaning Specifications						
Application	TMP Range kPa (psig)	Max. Operating Temp. °C (°F)	Operating pH Range	Max. Cleaning Temp. °C (°F)	Cleaning pH Range	Max. Cl ₂ Conc'n (ppm)
MBR	-55 to 55 [-8 to 8]	40 [104]	5.0-9.5	40 [104]	2.0 - 10.5 [<30°C] 2.0 - 10.0 [30-40°C]	1,000

3.2 controls upgrade hardware - optional adder

item description	part #	quantity
Panelview Plus 7 Standard 7", 24VDC		1
CompactLogix 2 MB ENet controller	3169986	1
Compact IO 24VDC input, 16 point	3169982	2
Compact IO relay output module, 16 point	3169983	3
Compact IO analog input module, 8 channel	3169984	1
Compact IO analog output module, 4 channel		2
Compact IO analog universal input module, 4 channel		1
6- and 4- screw RTBs for controller power	3169368	1
SLC conversion rack 10 slot		1
conversion cables		9
Stratix 2000, Ethernet switch 5 copper ports, unmanaged	3184714	1
Power Supply, 120 W, 24V DC		2

4 SUEZ support

4.1 engineering study visit – optional adder

Prior to commencing work on the controls upgrade, SUEZ will provide 1 field service representative (FSR) on-site for 1 x 8-hour day to properly review the current system configuration for the purposes of assessing the full scope of work that needs to be carried out to complete this upgrade.

SUEZ's proposal details the materials, off-site and on-site support that our preliminary analysis has determined are needed, which include a separate plastic enclosure to house the HMI with the PLC/IO being installed in the existing panel, fitment will need to be reviewed during the site visit due to the current position of the PLC and the wire entry at the bottom of the panel. Note, as the current function of 1747-KE is unknown/undocumented this device will not be updated or migrated and will be removed.

Should the engineering visit determine any required changes to this planned scope, adjustments will be detailed, and final revised pricing will be provided to Riddle Farms.

4.2 off-site support

controls upgrade – optional adder

Based on a preliminary review the following off-site support has been included for the controls upgrade adder:

- PLC programming time: 80 hours;
- HMI programming time: 40 hours;
- FAT set up and test: 40 hours;
- electrical drawings: 100 hours.

controls

Provide system controls programming adjustments as required for the new membranes including adjustment of set points for permeate, backpulse and air flow as required.

If there is a requirement for the EEPROM (Electrically Erasable Programmable Read-Only Memory) to be stored, a period of plant shutdown must be arranged by Riddle Farms.

documentation

The base level of documentation updates will include:

- programmer's table of code changes (change description recorded by tag with one distinct marker bit per change);
- field/hand markups of relevant electrical and P&ID drawings.

These updates should be filed in the O&M manual as interim documentation.

Due to the very high cost of comprehensive updating of plant documentation with each system upgrade, SUEZ recommends planning a complete documentation update every 1-4 years to coincide with a selected system upgrade.

SUEZ will be pleased to develop a documentation update price quotation on request which may include some or all of the following scope according to its relevance:

- O&M manual** - Provide a fully updated version of the operation & maintenance manual that indicates the changes made with this membrane replacement upgrade;
- P&IDs** - Update the process (piping) & instrumentation drawings and reissue electronically;
- electrical drawings** – Update the electrical drawings and reissue electronically;
- controls documents** – Update control narrative (CN), controls logic sequence chart (CLSC, also known as CSC) and the operation sequence chart (OSC).

project management

Provide planning and off-site assistance during the membrane upgrade project and the optional controls upgrade if taken.

4.3 on-site technical advisory services

controls upgrade – optional adder

With the purchase of the controls upgrade adder, SUEZ will provide 1 field service representative (FSR) on-site for a total of 4 x 8-hour days to provide on-site testing and programming support for the controls upgrade.

membrane installation

The proposal includes a provision for technical advisory services during installation and commissioning process to support Riddle Farms' staff as outlined in section 2. Please see section 7.2 for recommendations on the number of plant staff necessary to perform the work.

Installation and commissioning of membranes will be executed one train at a time to minimize down-time and to return each train to beneficial use in a timely manner.

The following activities will be completed by plant staff with SUEZ oversight assistance:

- remove existing membranes/cassettes;
- install the new membrane modules/cassettes;
- upload required revisions to the PLC program with adjusted set-points;
- perform bubble test where applicable to test membrane integrity and review trans membrane pressure (TMP) on the installed membranes and compare to expected values for new membranes; complete repairs/adjustments necessary to provide new membrane performance.

operating responsibility - Riddle Farms retains control of the work site and retains final responsibility for the installation and commissioning process.

SUEZ will perform the services specified in the scope section of this document, but SUEZ will not operate the system. For the purposes of this agreement, the term “operate the system” shall mean to run or control the functioning of the equipment or to otherwise conduct or manage the affairs of any aspect of water or wastewater treatment or other functions at Riddle Farms’ site, and shall include functions such as providing operators or laborers to adjust or control water treatment (“WT”) equipment, wastewater treatment (“WWT”) equipment or sludge management facilities (“SMF”), providing program oversight or directing on-site or contract operators/laborers to adjust or control WWT or SMF, providing personnel responsible for or providing oversight of water treatment residual quality, wastewater effluent quality, sludge quality, waste characterization, or waste disposal activities, or providing personnel with continual or daily operational responsibilities with respect to water or wastewater treatment, influent or effluent compliance monitoring, process monitoring, government reporting or notification, or permit compliance.

waiting time - Any overtime or waiting times required due to unforeseen site events outside the control of SUEZ will be invoiced according to the prevailing SUEZ service labor rates sheet, available on request.

reporting - Before leaving site, SUEZ will record observations and discuss with operators concerning the condition of the equipment, tasks accomplished during the visit, and key operating and maintenance issues requiring further attention. SUEZ will provide a copy of a written report before leaving site and/or provide a service visit report to the plant operator within a reasonable timeframe of the SUEZ service representative’s return to the office. In any case, Riddle Farms will be asked to sign a work order that describes the hours on site and tasks accomplished.

SUEZ duties for on-site services

- SUEZ will coordinate its work under this agreement in a reasonable manner with the operating staff of the facility.
- SUEZ will maintain public liability and property damage insurance covering all operations undertaken by SUEZ and its sub-contractors with a limit of \$5,000,000 inclusive for any one accident or occurrence. If for any reason additional insurance coverage (e.g. general construction/erection all risk, general liability) is required above and beyond SUEZ’s standard insurance terms for on-site commissioning supervision, Riddle Farms must inform SUEZ in writing 60 days prior to work commencement at site. Riddle Farms will be billed for all additional insurance costs and processing fees.
- SUEZ will maintain workers compensation and employers’ liability coverage as per statutory requirements.

5 delivery

- freight**
 - DDP** - Delivery will be by standard ocean/ground standard on the basis of DDP Glen Riddle WWTP, 11401 Gray’s Corner Road, Berlin, MD 21811 or other named place of destination; Incoterms 2020. DDP = delivery duty paid.

Partial shipments will be acceptable unless otherwise specified. Where delivery cannot be accepted at this destination, Riddle Farms shall specify an alternate, equivalent destination without delay.

Due to varying origins and availability, non-membrane items included in this proposal may be shipped separately from the membranes. Should separate shipments be required, where possible, SUEZ will strive to provide these items on or before the delivery of the membranes.

- title & risk** - Title and risk of loss or damage to membrane modules, cassette frames and crating shall pass to Riddle Farms upon delivery at the named place of destination.
- international shipment, fees, and duties**
 - origin** - Delivery of ZeeWeed membranes originates from the SUEZ Water Technologies & Solutions, ZENON Membrane Products (ZEM), Bláthy Ottó u 4, Oroszlány, 2840 Hungary facility. Costs to transport membranes into North America are included in SUEZ's quoted price.
 - export documents** - All ZeeWeed membrane module shipments into the USA require clearance documentation from the EPA. SUEZ will prepare and provide the required EPA documentation to the Carrier.
 - MPF** - Merchandise processing fee is a fee assessed for formal custom entries based on 0.35% of the invoice value, with a minimum of USD \$25 per formal entry and a maximum of USD \$485. On the basis of DDP terms, this fee will be paid by SUEZ within the quoted price.
 - duty** - Any new duty imposed after the date of this proposal is the responsibility of Riddle Farms.
- taxes** - All applicable local, state, or federal taxes are the responsibility of Riddle Farms.
- temperature** - UF membranes cannot be allowed to freeze or overheat and may require temperature-controlled freight and handling according to the season and the planned routing. If required, the price of temperature control will be included within the firm quote on freight by SUEZ.
- packaging** – Factory-installed in operational cassettes.
- unloading** - may require one of or a combination of a loading dock, extended forks and an experienced forklift driver at delivery destination. Please consult with SUEZ at the time of purchase order (PO) preparation on this.

shipping crate information (estimated)

qty	description	dimensions (in)	weight (lb)
6	ZW500D 16M cassette crate	L=108 x W=36 x H=83	1,634

notes:

- only crates for membrane/cassette transport have been shown above to identify the largest and heaviest items that will need to be unloaded;
- smaller crates/skids will be used for hardware items (spool connection components, etc.).

handling – ZW500D 16M membrane cassette frames are shipped and will arrive on-site on their sides. An eye bolt kit, included in this proposal, should be used to safely turn the cassette(s) upright. Adequate work area and height and equipment will also be needed to be available to safely turn the cassettes upright for installation.

availability - Delivery of is typically **10-20** weeks after receipt of order.

With current global logistics and freight delays, delivery is estimated at **59-61** weeks after receipt of order.

Definitive availability will be confirmed once a purchase order is received from Riddle Farms and acknowledgement of a purchase order is issued by SUEZ.

6 ZeeWeed configuration

configuration data	units	previous ZW plant configuration	proposed configuration after replacement/upgrade
number of trains, plant		2	2
type of ZeeWeed membrane		ZW500C	ZW500D
module surface area	ft ²	220	430
		250	
total number of cassette spaces per train		3	3
maximum number of modules per cassette		22	16
fully populated cassettes installed per train		2 ^{note 1}	--
flex cassettes installed per train		--	3
installed number of modules per flex cassette		--	12
total module count, train		44	36
total surface area in operation, train	ft ²	10,340	15,480
total module count, plant		88	72
total surface area in operation, plant	ft ²	20,680	30,960
% surface area change from existing, plant	%	--	50%
minimum temperature	°C	10	10
flow capacity, average daily flow ADF	MGD	0.20	0.28
design net flux at ADF at min. temp.	GFD	9.67	9.04
flow capacity, maximum daily flow MDF	MGD	0.40	0.56
design net flux at MDF	GFD	19.34	18.09

note 1: Each train had one (1) cassette installed with 220ft² modules and one (1) cassette installed with 250ft² modules.

note 2: The stated flows are based on membrane capacity only. Verification of the capacity of other equipment and systems, including but not limited to permeate pumps, RAS pumps, blowers, biological treatment tanks, piping etc., has not been considered.

note 3: The basis of design used for this upgrade is the original ZeeWeed design conditions for the Glen Riddle WWTP.

7 scope - Riddle Farms

7.1 installation preparation

- Receive, off-load, handle and provide temperature-controlled storage of the equipment and materials required for Seller to perform the duties outlined in the

Seller's scope of supply. Prior to off-loading, Buyer to confirm temperature indicators have not been tripped.

- Membranes must be stored in a sheltered area, protected from freezing, direct sunlight or extreme heat, and sealed as shipped until ready for use. Storage should be in a dark, dry, level area at a temperature of 5-30°C (41-86°F). Membranes have a shelf life of 1 year before requiring re-preservation and should not be stored longer than necessary prior to installation. Riddle Farms is responsible for risk of loss of Seller's parts while in storage at the customer's plant.
- Inspect, evaluate and make repairs as required for the membrane tanks, mounting brackets, hoses and all connections prior to SUEZ arriving at site.
- Installation of all SUEZ supplied loose-shipped equipment (drop frames).
- Provide all access structures (such as scaffolding) and mechanical lifting equipment including cranes, forklifts and scissor lifts.
- Assure availability of a copy of the operating manual, all process and instrumentation drawings, and all electrical drawings on site and accessible for reference.
- Maintain adequate insurance coverage for the risks of fire, theft, vandalism, floods and personal injury to authorized or unauthorized visitors.

7.2 installation

- Provide 1 or more plant personnel to work continuously for the full duration of the SUEZ site visits during installation and commissioning of the modules. SUEZ recommends that the personnel be experienced with the ZeeWeed system.
- Riddle Farms will afford Seller's personnel free access and egress of the facility for all authorized work. Riddle Farms will provide reasonable access to workshop facilities with standard workshop tools and equipment as is necessary to meet any repair and maintenance requirements of the system during installation. Riddle Farms will provide Seller's personnel reasonable access to the facility amenities, including washrooms and break rooms.
- Provide adequate illumination and emergency lighting for all areas in which the Seller will be executing the scope of supply. Provide all site utilities such as raw water, instrument quality air, potable water and power required for operation of the proposed equipment included in this scope of supply. Assure that adequate quantities of membrane cleaning and neutralizing chemicals are on hand for wash procedures including sodium hypochlorite, sodium bisulphite, citric acid and sodium hydroxide. Supply telephone/fax/modem access while Seller's staff members are on-site.
- Riddle Farms will provide assistance to:
 - remove membranes/ cassettes from the system as required;
 - install new ZeeWeed cassettes into the system with spools.
- Riddle Farms will:

- dispose of all retired membrane modules and cassette components;
- dispose of shipping and packaging materials unless specifically requested not to do so by SUEZ.

controls upgrade - optional adder

- Riddle Farms, or their third party designate, will be responsible for installation of all hardware, and all related wiring, conduit, HMI panel mounting, and electrical work needed to facilitate this upgrade.
- Riddle Farms will be responsible to report to SUEZ regarding any new I/O added by Riddle Farms. This will allow SUEZ to verify that there is sufficient I/O available to accommodate the additional equipment supplied by SUEZ for this upgrade. Additional costs will be added if additional hardware or support is required.
- Any integrated control system may require modifications as part of this work. SUEZ has included engineering support for required changes to the membrane control system. Riddle Farms will be responsible for any required updates to extended plant controls or SCADA that are not expressly included in SUEZ's scope.

8 solution design notes

8.1 permits

regulatory requirements

Riddle Farms is responsible to review and report to the permit granting agency on the impact of any of the proposed changes on the regulatory permit. SUEZ will provide the necessary manufacturer's technical support on regulatory issues.

Please speak with your regional lifecycle manager (RLM) if there are any regulatory requirements or concerns.

utilization

SUEZ understands that these modules are required as replacements for currently installed modules.

SUEZ understands that these modules are required to replace and upgrade the currently installed modules and to expand the capacity of the existing treatment plant.

It is SUEZ's understanding that the cassette/drop frame support system (beams etc.) is already installed. If this is not so, please advise SUEZ and request that this be added to the proposal.

production interruption

During installation of the ZeeWeed cassettes, trains will be shut down which will affect Riddle Farms treatment capacity. After the purchase order is acknowledged, SUEZ's project manager for the installation will consult with Riddle Farms to jointly develop the installation plan and work schedule with due regard for membrane delivery to the plant and plant preparation.

8.2 maintenance notes for replacement membranes

At the time of any full plant or full train membrane replacement, it is recommended to evaluate whether it is the right time to address any tank coating repairs which may be required.

preferential flow

Mixing a small proportion of new modules in trains with large amounts of older modules is not recommended as it creates a risk of over-fluxing of new modules, which can shorten their lives. SUEZ recommends that Riddle Farms plan membrane module replacement on a complete cassette and complete train basis wherever possible to achieve both optimal performance and best value from the new membrane modules. In this case, by replacing all membrane modules in the plant, this risk has been neutralized.

membrane slack

SUEZ's membranes are supplied and shipped with an initial factory fiber slack designed to optimize membrane air scouring during operation as well as accommodate a degree of shrinkage. Membranes shrink in length early in their lifecycle when exposed to higher temperature water. The pace of shrinkage slows with age. With the installation of new membranes, the requirements for slack adjustment start a new cycle.

Due to the wide variety of operating environments in which our products can be utilized, it is difficult to generally predict the rate of shrinkage. If membranes operate in a condition of insufficient slack for an extended period of time, irreversible damage to the fiber-urethane bond may occur. Please refer below to the recommended inspection frequencies based on your plant's membrane tank operating temperature. Visual inspections should begin during the membrane installation and be repeated over time on the same cassette. Digital pictures will allow for comparative analysis of the fiber slack over time.

maximum operating temperature	recommended slack inspection frequency
0-24 °C / 32-76 °F	every 2 years
25-30 °C / 77-86 °F	once per year
>30 °C / > 86 °F	twice per year

bubble test pressure

The bubble test pressure for the purchased membranes is 2 psi horizontally and 3 psi vertically.

8.3 technical

benefits of ZW500D modules

The technical and economic advantages of the ZW500D modules include:

- higher surface area density;
- each module is individually removable to simplify access for efficient membrane maintenance;
- SUEZ investments in R&D will continue to improve upon the ZW500D technology;

new cassette frames

There are considerable benefits that come with replacing cassette frames at the same time as membranes are replaced. Replacing membranes at the same time as cassettes can be cost competitive and lower risk compared to replacing modules alone from individual boxes for the reasons described below. In this case, as Riddle Farms moves from ZW500C modules to ZW500D modules, a change to a new cassette frame is a necessity but the benefits still apply.

- Doubled packing density of modules in the cassettes reduces shipping costs.
- Reduce labor for installation.
- Shorten plant down-time.
- Plastic cassette components are subject to aging with time and exposure to chemicals. Replacing plastics with each new generation of membranes reduces the risk of cassette component repair events.
- Remove the opportunity for module damage during installation.
- Reduce packaging waste and lower disposal cost.
- Replaced stainless steel frames can be sold for scrap.

lifting weight & height

The lifting weight ranges for ZW500D cassettes differ from the current ZW500C cassettes and need to be considered to ensure that the site has adequate lifting capacity available to install and later remove the cassettes safely.

cassette type	lifting weight range (lb.)	cassette height (in.)
ZW500D 16M	1,713 – 3,208	98.9

Cassette lifting weight ratings have a range as weights may vary due to the number of modules in the cassette and the degree of solids accumulation in an upset condition.

Riddle Farms is also responsible to undertake an on-site confirmation that crane lifting heights are adequate in all areas of the plant to accommodate this proposed change.

LEAPmbr aeration upgrade - simple & efficient

LEAPmbr aeration technology is SUEZ’s latest technology advancement for wastewater treatment which incorporates a dramatically simplified, more efficient membrane aeration system offering significant savings in operating cost.

- reliability through simplified design – Innovation doesn’t have to be complex. With simplicity as a design objective, LEAPmbr has reduced membrane aeration equipment and controls without compromising on flexibility;
- energy savings – LEAPmbr, with its reduced blower output requirements for scouring air, can provide a 30% reduction in blower energy use under normal operation and up to a 50% reduction depending on the system configuration;

- ❑ maintenance savings – LEAPmbr aeration eliminates the requirement for high-frequency cyclic valves and the associated maintenance. Compressed air requirements are also reduced.

other considerations

blowers

For the purposes of this proposal, the range of blower capacity has been assumed to be adequate for this upgrade.

Any resheaving parts as well as mechanical and electrical adjustments required to meet new air flow will be completed by Riddle Farms or their 3rd party designate. SUEZ will assist Riddle Farms in determining correct air flow requirements for the new plant configuration.

pre-screen

Trash and non-biodegradable solids, such as hair, lint, grit and plastics may foul or damage the membranes if allowed to pass into the membrane chamber. SUEZ recommends that an internally-fed screen with mesh or punched-hole openings less than or equal to 2 mm with no possibility of bypass or carryover be operated upstream of the new membranes to ensure effective operation and to maximize membrane life.

9 health & safety

Riddle Farms

- ❑ Riddle Farms will provide orientation to Seller's personnel to ensure site-specific safety protocols are known. Riddle Farms will identify and inform Seller's personnel of any site-specific hazards present in the workplace that could impact the delivery of Seller's scope of supply and agrees to work with Seller to remove, monitor, and control the hazards to a practical level.
- ❑ Riddle Farms will provide any site-specific or standard company operating procedures and practices for Seller's personnel to perform work on site, if required by Riddle Farms' policies. Such programs may include, but are not limited to, general environmental health & safety (EHS), HAZOP, fire protection, drug testing, incident notice, site conduct, standard first aid, chemical receiving, electrical safety, etc. Riddle Farms will provide a certificate of program completion for Seller's personnel. This program will be fully documented, training materials will be provided, and attendance list will be kept.
- ❑ If any type of lifting devices will be used on site, Riddle Farms will provide proof of its maintenance, inspection and certification documentation upon request and will assist the SUEZ service representative to complete a safety inspection checklist.
- ❑ Where confined space entry may be required, Riddle Farms will provide early notice and will collaborate with SUEZ in planning adequate staffing and in advising the local fire/rescue department as required.

- ❑ No time or cost provision has been made for preparations such as safety record clearances, drug testing, insurance confirmations or pre-job-training in excess of 1 hour. Prior to finalizing the Purchase Order and the work schedule, Riddle Farms will advise SUEZ of any pre-job or pre-mobilization requirements. Where these requirements exceed 1 hour, this time will be charged to Riddle Farms at rates set out in the prevailing SUEZ labor rate sheet.
- ❑ Where certain short duration activities require two people for safety and the SUEZ Service representative is alone at site, Riddle Farms will cooperate as required to assure that correct safety precautions are taken.
- ❑ Riddle Farms is responsible for the following environmental provisions:
 - environmental use and discharge permits for all chemicals at Riddle Farms' facility either listed in this document or proposed for use at a later date;
 - any special permits required for Seller's or Riddle Farms' employees to perform work related to the water treatment system at the facility;
 - all site testing, including soil, ground and surface water, air emissions, etc.;
 - disposal of all solid and liquid waste from the Seller's system including waste materials generated during construction, start up and operation.
- ❑ Riddle Farms is responsible for provision of health and safety facilities to Seller's field service representatives to the same extent that they are provided to Riddle Farms' own employees, including provision of:
 - eyewash and safety showers in the water treatment area;
 - chemical spill response;
 - security and fire protection systems per local codes;

SUEZ

- ❑ All work on site will be performed in accordance with applicable law and will be performed reasonably, in a clean and safe manner. The SUEZ service representative will abide by the more stringent of the applicable health, safety and environmental policies and procedures of either Riddle Farms or SUEZ.
- ❑ SUEZ will provide all applicable safety training required by SUEZ policies or by state or national health and safety regulations. The SUEZ service representative will have undergone workplace hazardous material information system (WHMIS) training and will come equipped with necessary personal protective equipment (PPE).
- ❑ Emergencies - In emergencies affecting the safety of persons, work or property at the site and adjacent thereto, SUEZ will act, without previous instructions from Riddle Farms, as the situation warrants. SUEZ will notify Riddle Farms immediately thereafter.

10 ZeeWeed Membrane Module Standard Warranty

This schedule sets out the warranty with respect to ZeeWeed membrane modules (“membrane modules”). No other warranties, expressed or implied are made in connection with the sale of these products, including, without limitation, warranties as to fitness for any purpose or use or merchantability of these products. The warranty provided herein will be the exclusive and sole remedy of Buyer. This warranty is not transferable.

1. Definitions

The following terms shall have the meaning set forth below when used in the warranty document:

- a) “Buyer” means the party purchasing the ZeeWeed Modules from the Seller
- b) “Seller” means a business component of, or legal entity within the SUEZ Water Technologies & Solutions business which is selling the ZeeWeed membranes.

2. Warranty Product

This warranty applies to only the membrane modules supplied under the contract of sale. Membrane module means the hollow fibre ultrafiltration membranes and the potted plastic headers. This warranty does not cover air piping to the membrane module, permeate piping from the membrane module, piping connection fittings, connecting hardware and cassette frames with their associated components including but not limited to spacers, aerator tubes, aerator assemblies, screen, module dummies or module blanks.

3. Scope of Warranty

The Seller warrants that its membrane module(s) will be free of defects due to faulty materials or errors in manufacturing workmanship.

Regular membrane module inspection and normal fibre repair shall be the responsibility of Buyer.

All replacement membrane modules will be shipped on the basis of INCOTERMS 2020 FCA SUEZ manufacturing facility.

All ancillary costs including but not limited to bagging, boxing, crating, freight, freight insurance, applicable taxes, import duties, certifications, brokerage, receiving, forklift services, storage at site, reattachment hardware, hose/clamp/camlock replacement, crane services, installation, fibre repair materials, glycerin flushing, commissioning and waste disposal are the responsibility of Buyer.

4. Warranty Start Date

Membrane warranty will start on the earlier of:

- a) The date that installation of the original membrane module(s) has been substantially completed, or
- b) Three (3) months from the date of delivery of the original membrane module(s) to Buyer.

5. Warranty Duration

Total Warranty Duration: a total of 24 months of full replacement warranty coverage.

6. Notification of Claim

All claims filed under this warranty shall be made in writing by Buyer within 30 days of identifying a defect.

Buyer shall provide the following information:

- a) A description of the defect giving rise to the claim;
- b) Photographs showing the manufacturing defect;
- c) The serial number(s) of the membrane module(s) which is (are) the subject of the warranty claim; and
- d) Operating data and repair history for the life of membrane modules which are the subject of a warranty claim.

7. Verification of Claim

After receipt of written notification of a defect, the Seller will promptly undertake such investigations as, in the Seller's opinion, are necessary to verify whether a defect exists. The Seller reserves the right to require additional data as necessary to validate claims. Buyer may, in the course of these investigations, be requested to return membrane module(s) to the Seller for examination (see section 11). The Seller may also conduct reasonable tests and inspections at Buyer's plant or premises. If the results of the

investigation do not validate the defect claimed, Buyer will reimburse the Seller for all reasonable expenses associated with said investigation, including expenses for all tests, inspections, and associated travel.

8. Satisfaction of Claims

The Seller will have the right to satisfy claims under this warranty in a flexible manner. Such flexibility may include the repair of existing membrane modules or changes in operating protocols or membrane module replacement or by upgrading failed membrane modules with newer membrane module(s) that may embody design and efficiency improvements. Buyer consents to the supply of replacement membrane modules which may be of a different design than original membrane modules.

9. Operating Information

To maintain the membrane module warranty, membrane system operation records from initial start-up date until claim must be maintained by Buyer and made available to the Seller upon request. Records must be provided in sufficient detail as applicable to verify the subject of a warranty claim and can include but is not limited to, operation data including information on feed water quality, temperatures, flows, trans-membrane pressures, aeration rates, permeate quality, cleaning intervals, cleaning chemical concentrations, elapsed time since start-up, relevant analytical data and reporting of any screen bypass events.

Buyer shall maintain and share access to a single reference copy in electronic form of a membrane module map containing the history of activity by membrane module and the serial number for each module. Buyer shall log its procedures performed related to a membrane module including relocation of membrane modules, repairs, replacements and any other noteworthy events.

Buyer authorizes the Seller to conduct any reasonable review of operation and maintenance records or to inspect facilities where membrane modules are installed, upon reasonable notice to Buyer. Such reviews and/or inspections are intended to also assist the Seller and Buyer in detection of membrane system faults and to optimize the care and operation of the membrane modules.

10. Limitation of Warranties

Occurrence of any of the following as reasonably determined by the Seller will void this warranty:

- a) A material failure to operate the membrane system in accordance with Seller's operations and maintenance manual supplied to Buyer as part of the contract, including material failure to adhere to the Seller's specified membrane module cleaning procedures and the use of anything other than Seller-approved membrane module cleaning agents.
- b) Failure to adhere to the preventive maintenance program as presented in the Seller's operations and maintenance manual, in published product manuals and in specifications.
- c) Failure to adhere to all transportation and storage requirements. ZeeWeed membrane modules may be stored up to 12 months from date of receipt and must be transported and stored in original intact packaging out of direct sunlight in ambient temperatures between 5-35 Degrees Celsius. Storage beyond 12 months from date of receipt requires a written request to SUEZ to maintain membrane module warranties.
- d) Introduction of destructive foreign materials and chemical agents into the membrane module.
- e) Failure to maintain and provide system operating data and repair history for the life of membrane modules which are the subject of a warranty claim.
- f) Physical abuse or misuse, incorrect removal or installation of membrane modules by non-Seller personnel including fibre damage caused by operator error in handling of membrane modules or cassettes.
- g) Unauthorized alteration of any components or parts originally supplied by the Seller.
- h) Intentional damage.

11. Return Procedure

In the event that the return of a membrane module is required pursuant to this warranty, Buyer will first obtain a Return Goods Authorization (RGA) number from the Seller. Membrane module(s) shipped to the Seller for warranty examination must be shipped freight prepaid in environmentally controlled freight and storage with ambient air temperature between 5-35 degree Celsius. If Buyer desires temporary replacement membrane module(s) to replace those alleged to be defective and returned to the Seller for warranty examination, Buyer shall be responsible for the cost associated with any such replacements until examination of the returned membrane modules pursuant to this warranty is complete. Any membrane module examined by Seller as part of a warranty claim where the membrane module is subsequently found to be performing as warranted or where a membrane module failure is not

covered under the warranty will be returned to Buyer, freight collect or disposed of by Seller and the cost associated with any membrane analysis and diagnostic work will be levied against the Buyer based on SUEZ standard labour rates.

12. Disclaimer and Limitation on Liability

To the maximum extent permitted by law, in no event shall Seller be liable for any loss of profit or revenues, loss of production, loss of use of equipment or services or any associated equipment, interruption of business, cost of capital, cost of replacement water or power, downtime costs, increased operating costs, claims of Buyer’s customers for such damages, or for any special, consequential, incidental, indirect, punitive or exemplary damages arising out of or relating to the performance or actual or alleged breach of the agreement, regardless of whether a claim is based in contract (including warranty or indemnity), extra-contractual liability, tort (including negligence or strict liability), statute, equity or any other legal theory.

11 terms and conditions of sale

a - specific terms and conditions of sale

These terms take precedence over the general terms and conditions of sale.

1 legal entity for contracting

ZENON Environmental Corporation is the name of the Seller, and means a business component of, or legal entity within the SUEZ Water Technologies & Solutions business (SUEZ).

Please advise us if this SUEZ entity is not set up in your purchasing system as a vendor and you do have another SUEZ entity set up. We are keen to make the purchase process as convenient as possible for Riddle Farms.

short form: Where a short reference is required in this document, for convenience, we are called simply **SUEZ**.

2 payment

SUEZ prefers to receive payment by wire transfer and will also accept payment by courier check.

Wire transfer information for ZENON Environmental Corporation send details to: SHD WATS REMIT-NAM shd-wats-remit-nam@suez.com	
Bank of America Merrill Lynch C/O ZENON Environmental Corporation 901 Main Street Dallas, TX 75202	ACCT# 4426318136 ABA# 026009593 SWIFT# BOFAUS3N ACH# 111000012

3 payment terms

On approved credit, payment terms are net 30 days from customer receipt of invoice. Please see the invoicing schedule in the price section. In the event an invoice is issued on shipment of goods from a SUEZ Hungarian production facility, payment terms will be extended by an additional 45 days to account for the additional transit time to the delivery location.

4 proposal validity

Prices quoted and proposal terms are valid up to thirty (30) days after the date of issue of this proposal unless confirmed with a purchase order.

5 bonds

Performance or payment bonds are not included in the price. These bonds can be purchased on request but will be at an additional cost.

6 assignment of membrane warranty

The Buyer will be entitled to assign to a subsequent owner of the membranes the warranties of the Seller under this Agreement, provided that a prior written notification is sent to the Seller and the assignment agreement contains terms and conditions which

provide the Seller with the protections of the warranties and limitations on liability contained in the Agreement. Subject to Buyer's compliance with the foregoing requirement, such warranty rights are expressly assignable by the Buyer to a subsequent owner of the membranes. Except as provided herein, Buyer is not entitled to extend or transfer this warranty to any other party.

7 flight booking

Prices quoted for installation which include airfare are either based on timely confirmation of a visit schedule or based on receipt of a purchase order in time to book any flights seven days in advance. Additional airfare charges related to late arrival of a purchase order will be extra and billed through to Riddle Farms without mark-up.

8 warranty on programming

SUEZ warrants that the PLC program will conform to the specifications in the relevant sections of the CLSC and OSC (revised for the project) and will be free from defects in workmanship when operated at all times in accordance with SUEZ's written instructions. If any defects are found and reported by Riddle Farms within a period not exceeding twelve (12) months beyond the completion of the site acceptance test, SUEZ will make modifications to the PLC code as deemed necessary. Any changes requested by Riddle Farms after this period will be at the customer's expense.

9 purchase order guidelines

Please confirm that your purchase order has covered the following points. This will ensure accurate and prompt order entry, product delivery, invoicing and accounts receivables processing and will prevent administrative delays for all parties.

- documentation** – Our strong preference is to receive a hard or digital copy of your purchase order (PO) rather than a PO number alone. Your PO can be sent by email to service.pocentral.wts@suez.com. If you are not able to provide a PO, please contact us for alternatives.
- SUEZ legal entity** – Please be sure your purchase order is issued in the name of the specific SUEZ legal entity outlined in the quote. We will be glad to work with your purchasing department to set this entity up as an approved supplier/vendor. Please advise us if this SUEZ entity is not set up in your purchasing system as a vendor and you do have another SUEZ entity set up.
- quotation number** – Please reference the quotation number in your PO.
- product** – Please note which product(s) you wish to purchase along with the quoted price, particularly if quantities or scope differ from the quotation.
- taxes** – Please provide any required tax exemption certificates. Please indicate if taxes have been added in your PO.
- payment terms** – Please acknowledge the payment terms included with the quotation.
- bill-to address** – Please include contact information for your accounts payable.
- ship-to address** – Please clearly define the delivery location and the receiver's email & telephone. Please specify receiving hours and any special off-loading requirements.
- delivery date** – Please include your requested delivery date.

b – general terms and conditions of sale

SUEZ's standard terms and conditions apply. See attachment a.

Note to purchasing agent: The SUEZ's standard set of commercial terms & conditions are written for moderate value transactions to allow an efficient and rapid provision of services and parts. Where corporate agreement terms have been previously agreed, these may be brought forward by either party and applied by mutual consent. If either of these terms sets are not immediately acceptable, please expect a typical 6-10 week cycle of mutual review to build agreement on changes.

12 signed agreement

Through the issue of this proposal, SUEZ signals their intent to enter into an agreement with Riddle Farms. Riddle Farms and SUEZ acknowledge that they have read and understood this agreement and agree to be bound by the terms and conditions specified in it.

offered by legal entity: ZENON Environmental Corporation, also known as SUEZ or Seller

accepted by legal entity: Worcester County Department of Public Works
also known as Riddle Farms or Buyer

authorized signature by: _____

title: _____

signature date: _____

signature: x _____

purchase order no: _____

Upon acceptance of this proposal, please forward the following either

• by email with .pdf attachments or • by postal mail or • by fax.

1) this signature page completed to:

2) a hard copy of your purchase order, and

3) any required tax exemption certificates

service.pocentral.wts@suez.com

or

SUEZ Water Technologies & Solutions

attention: Contracts Administrator

Please contact

service.pocentral.wts@suez.com

for correct address

or

fax no.: 905 465 3050

This agreement comes into force when SUEZ has issued a formal acceptance of Riddle Farms' Purchase order or formal acceptance of this Riddle Farms signed agreement.

doc. control: author: JP (rev 0,1), AA (rev 2) filename: Riddle Farms 496439-2 membrane upgrade 72xZW500D 430ft² Nov 28 2022
last modified: 11/28/2022 10:59 AM technical review: JE (rev 0,2), YM (rev 1) commercial review: JE (rev 0,2), MS (0,2) DOA: BIKT

attachment a SUEZ standard terms and conditions

general terms and conditions of sale

1. exclusive terms and conditions. Together with any other terms the Parties agree to in writing, these General Terms and Conditions – together with the last proposal in order of time issued by the Seller – form the exclusive terms (“Agreement”) whereby Buyer agrees to purchase, and Seller agrees to sell products and equipment (jointly “Equipment”) and to provide advice, instruction and other services in connection with the sale of that Equipment (“Services”). If Buyer sends to Seller other terms and conditions to which Seller may not respond, including but not limited to those contained in Buyer’s purchase order, such shall not apply. This Agreement may only be revised by a change order approved in writing by both Parties. All terms not defined herein shall be defined in Seller’s proposal.

2. equipment and services. The Equipment to be delivered and the Services to be provided shall be as set out in this Agreement. Unloading, handling, storage, installation, and operation of Buyer’s systems or the Equipment are the responsibility of Buyer. Buyer shall not require or permit Seller’s personnel to operate Buyer’s systems or the Equipment at Buyer’s site.

3. prices and payment. Buyer shall pay Seller for the Equipment and Services in accordance with the payment schedule (as set forth in Seller’s proposal or, if applicable, in any special conditions agreed to in writing by the Parties). Unless otherwise specified in writing, payment is due net thirty (30) days from the date of Seller’s invoice. Seller may require a Letter of Credit or other payment guarantee, in which case the stated amount of the guarantee will be adjusted by Buyer in the event of any currency-based adjustment to prices or payment amounts per the Payment Schedule, and Buyer shall deliver the adjusted guarantee within five (5) days of request by Seller. Buyer agrees to reimburse Seller for collection costs, including 2% (two percent) interest per month (not to exceed the maximum amount permitted by applicable law), should Buyer fail to timely pay. Buyer shall have no rights to make any deduction, retention, withholding or setoff relating to any payments due under this Agreement.

4. taxes and duties. Seller shall be responsible for all corporate taxes measured by net income due to performance of or payment for work under this Agreement (“Seller Taxes”). Buyer shall be responsible for all taxes, duties, fees, or other charges of any nature (including, but not limited to, consumption, gross receipts, import, property, sales, stamp, turnover, use, or value-added taxes, and all items of withholding, deficiency, penalty, addition to tax, interest, or assessment related thereto, imposed by any governmental authority on Buyer or Seller or its subcontractors) in relation to the Agreement or the performance of or payment for work under the Agreement other than Seller Taxes (“Buyer Taxes”). The Agreement prices do not include the amount of any Buyer Taxes. If Buyer deducts or withholds Buyer Taxes, Buyer shall pay additional amounts so that Seller receives the full Agreement price without reduction for Buyer Taxes. Buyer shall provide to Seller, within one month of payment, official receipts from the applicable governmental authority for deducted or withheld taxes. Buyer shall furnish Seller with evidence of tax exemption acceptable to taxing authorities if applicable, prior to execution of the Agreement by both Parties or issuance by the Seller of the order acceptance. Buyer’s failure to provide evidence of exemption at time of order will relieve Seller of any obligation to refund taxes paid by Seller.

5. delivery, title, risk of loss. Unless otherwise specified in this Agreement, Seller shall deliver all Equipment to Buyer FCA (Incoterms 2020) Seller’s facility. The time for delivery of the Equipment to Buyer shall be specified in this Agreement. Seller’s sole liability for any delay in delivery of the Equipment shall be as expressly set out in this Agreement. The place of delivery specified herein shall be firm and fixed, provided that Buyer may notify Seller no later than forty-five (45) days prior to the scheduled shipment date of the Equipment of an alternate point of delivery, Buyer shall compensate Seller for any additional cost in implementing the change. If any part of the Equipment cannot be delivered when ready due to any cause not attributable to Seller, Buyer shall designate a climate-controlled storage location, and Seller shall ship such Equipment to storage. Title and risk of loss shall thereupon pass to Buyer and amounts payable to Seller upon delivery or shipment shall be paid by Buyer along with expenses incurred by Seller. Services provided herein shall be charged at the rate prevailing at the time of actual use and Buyer shall pay any increase, and Buyer shall pay directly all costs for storage and subsequent transportation. Failure by Buyer to take delivery of the Equipment shall be a material breach of this Agreement.

Title and risk of loss to the Equipment shall be transferred from Seller to Buyer at the point of delivery upon handover in accordance with this Agreement. Title and risk of loss to the Services shall pass as they are performed.

6. warranties and remedies. Seller warrants that Equipment shall be delivered free from defects in material, workmanship and title and that Services shall be performed in a competent, diligent manner in accordance with any mutually agreed specifications. Seller’s warranty does not cover the results of improper handling, storage, installation, commissioning, operation or maintenance of the Equipment by Buyer or third parties, repairs or alterations made by

Buyer without Seller's written consent, influent water which does not comply with agreed parameters, or fair wear and tear.

Unless otherwise expressly provided in this Agreement, the foregoing warranties are valid for:

- (a) chemicals and Services, for six (6) months from their date of delivery or the provision of Services;
- (b) consumables, including filters and spiral wound membranes (other than spiral wound membranes for process treatment), the earlier of twelve (12) months from date of first use or fifteen (15) months from their date of delivery;
- (c) spiral wound membranes for process fluid treatment, ninety (90) days from their date of first use;
- (d) ultrafiltration membranes (ZW500, ZW700B, ZW1000, ZW1500), twelve (12) months from their date of delivery;
- (e) Equipment other than chemicals and consumables, the earlier of, fifteen (15) months from delivery or shipment to storage, or twelve (12) months from start-up/first use;
- (f) software, ninety (90) days from the date of receipt;
- (g) Equipment not manufactured by Seller, the warranty shall be the manufacturer's transferable warranty only,

Any claim for breach of these warranties must be promptly notified in writing, and Buyer shall make the defective item available to the Seller, or the claim will be void. Seller's sole responsibility and Buyer's exclusive remedy arising out of or relating to the Equipment or Services or any breach of these warranties is limited to repair at Seller's facility or (at Seller's option) replace at Seller's facility the defective item of Equipment and re-perform defective Services. In performance of its obligations hereunder, Seller will not control the actual operation of either Buyer's systems or the Equipment at the Buyer's site.

Warranty repair, replacement or re-performance by Seller shall not extend or renew the applicable warranty period.

The warranties and remedies are conditioned upon (a) proper unloading, handling, storage, installation, use, operation, and maintenance of the Equipment and Buyer's facility and all related system in accordance with Seller's instructions and, in the absence, generally accepted industry practice, (b) Buyer keeping accurate and complete records of operation and maintenance during the warranty period and providing Seller access to those records, and (c) modification or repair of Equipment or Services only as authorized by Seller in writing. Failure to meet any such conditions renders the warranty null and void.

The Buyer will be entitled to assign to a subsequent owner of the Equipment the warranties of the Seller under this Agreement, provided that a prior written notification is sent to the Seller and the assignment agreement contains terms and conditions which provide the Seller with the protections of the warranties and limitations on liability contained in the Agreement. Subject to Buyer's compliance with the foregoing requirement, such warranty rights are expressly assignable by the Buyer to a subsequent owner of the Equipment. Except as provided herein, Buyer is not entitled to extend or transfer this warranty to any other party. The warranties and remedies set forth in this article are in lieu of and exclude all other warranties and remedies, statutory, express or implied, including any warranty of merchantability or of fitness for a particular purpose.

Unless otherwise expressly stipulated in this Agreement, Seller gives no warranty or guarantee as to process results or performance of the Equipment, including but not limited to product quality, flow, production, capacity, membrane life, chemical consumption, regulatory compliance or energy consumption.

7. general indemnity. Seller shall indemnify and hold harmless Buyer from claims for physical damage to third party property or injury to persons, including death, to the extent caused by the negligence of Seller or its officers, agents, employees, and/or assigns while engaged in activities under this Agreement. Buyer shall likewise indemnify and hold harmless Seller from claims for physical damage to third party property or injury to persons, including death, to the extent caused by the negligence of the Buyer, its officers, agents, employees, and/or assigns. In the event such damage or injury is caused by the joint or concurrent negligence of Seller and Buyer, the loss shall be borne by each Party in proportion to its negligence. For the purposes of this article (i) "Third party" shall not include Buyer or any subsequent owner of the Equipment, their subsidiaries, parents, affiliates, agents, successors or assigns including any operation or maintenance contractor, or their insurer; and (ii) no portion of the Equipment is "third party property".

8. compliance with laws and permits. All permits, authorizations, and licenses which are required to construct, install and/or operate Buyer's facility or equipment, to use the Equipment, or to manage and dispose of any wastes, discharges, and residues resulting from Buyer's use of the Equipment, shall be obtained and maintained by Buyer at Buyer's sole expense. Buyer is responsible for compliance with all laws and regulations applicable to the storage, use, handling, installation, maintenance, removal, registration, and labeling of all Equipment after delivery of the Equipment, as well as for the proper management and disposal of all wastes, discharges, and residues.

9. buyer's site conditions. Buyer warrants that any data furnished to the Seller concerning conditions at Buyer's site (including but not limited to any existing Buyer facility, equipment or processes, influent water or other substances to be treated or measured with the Equipment) is accurate and complete, and the Seller reserves the right to utilize the most appropriate design compatible with generally accepted engineering practices, and to make changes in details of design, manufacture and arrangement of Equipment unless precluded by any limitations specified in this Agreement. Seller shall notify Buyer of (1) any conditions at Buyer's site which materially differ from those indicated in the data furnished by Buyer, (2) any previously unknown physical conditions at Buyer's site of an unusual nature, not revealed by previous investigations and differing from those ordinarily encountered in the type of work provided for in this Agreement, and (3) the presence of any Hazardous Materials (as defined below), the existence of a contaminated soil, unexploded ordinance, or archaeological remains. If such conditions cause an increase in Seller's cost or in the time required for the performance of Seller's obligations, Seller shall be entitled to an equitable adjustment in the Agreement price and an extension in the time for performance.

10. hazardous materials and wastes. In the event that Seller encounters any Hazardous Materials (meaning toxic substances, hazardous substances, pollutants, contaminants, regulated wastes, or hazardous wastes as such terms may be defined or classified in any law, statute, directive, ordinance or regulations promulgated by any applicable governmental entity) at Buyer's site, other than Hazardous Materials introduced by Seller or that are otherwise the express responsibility of Seller under this Agreement, Buyer shall immediately take whatever precautions are required to legally eliminate such Hazardous Materials so that the Seller's work under this Agreement may safely proceed. At no time shall Seller be deemed to have taken title to or the responsibility for the management or disposal of any wastes, Hazardous Materials, influent water, any resultant product streams, wastewater streams, discharges, cleaning materials, or any other materials or substances processed by the Equipment or otherwise located at Buyer's site. Seller does not take responsibility for and hereby expressly disclaims responsibility for the characterization or disposal of wastes, Hazardous Materials, or for the identification, selection, or management of disposal facilities for any wastes.

11. excusable delays. Seller shall not be liable nor in breach or default of its obligations under this Agreement to the extent performance of such obligations is delayed or prevented, directly or indirectly, due to causes beyond the reasonable control of Seller, including, but not limited to: acts of God, natural disasters, unusually severe weather, fire, terrorism, war (declared or undeclared) epidemics, material shortages, insurrection, act (or omissions) of Buyer or Buyer's contractors/suppliers or agents, any act (or omission) by any governmental authority, strikes, labor disputes, transportation shortages, or vendor non-performance. The delivery or performance date shall be extended for a period equal to the time lost by reason of delay or non-performance, plus such additional time as may be necessary to overcome the effect of the delay or non-performance. If delivery or performance is delayed for a period exceeding 180 (one hundred and eighty) days, either Party may terminate this Agreement without further liability provided that Seller shall be paid an amount equal to that which would be payable to Seller under the article entitled "Termination". If Seller is delayed by any acts (or omissions) of Buyer, or by the prerequisite work of Buyer's other contractors or suppliers, Seller shall be entitled to an equitable adjustment in schedule, price and/or performance, as applicable.

12. emergencies. If the safety of Seller's personnel is threatened or likely to be threatened by circumstances outside the reasonable control of Seller, including but not limited to war, armed conflict, civil unrest, riots, terrorism, kidnapping, presence of or exposure to hazardous materials, unsafe working conditions, or by the threat of such circumstances or a lack of adequate protections against such circumstances, Seller shall be entitled to take all necessary steps to ensure the security and safety of its personnel including the evacuation of personnel until such circumstances no longer apply. Any such occurrence shall be considered an excusable delay event. Buyer shall reasonably assist in the event of any such evacuation.

13. confidentiality, intellectual property. Both Parties agree to keep confidential the other Party's proprietary non-public information, if any, which may be acquired in connection with this Agreement. Buyer will not, without Seller's advance written consent, subject Equipment to testing, analysis, or any type of reverse engineering. Seller retains all intellectual property rights including copyright which it has in all drawings and data or other deliverables (including the Equipment) supplied or developed under this Agreement. Buyer agrees that it will not file patent applications on the Equipment or any development or enhancement of the Equipment, or of processes and methods of using the Equipment, without Seller's express prior written permission. Buyer further agrees that in any event any such patents will not be asserted against Seller or its other buyers based upon purchase and use of such Equipment. Seller grants to Buyer a non-exclusive, non-terminable, royalty free license to use the intellectual property embedded in Equipment delivered to and paid for by the Buyer, as well as any drawings, design or data delivered to and paid for by the Buyer, for the purposes of owning, financing, using, operating and maintaining the relevant Equipment at Buyer's site. Such license may only be assigned to a subsequent owner of the Equipment or to an operations and maintenance subcontractor. Such license does not extend to the re-creation of the Equipment or the manufacture of spares or consumables by Buyer or third parties.

Any software Seller owns and provides pursuant to this Agreement shall remain Seller's property. Seller provides to Buyer a limited, non-exclusive and terminable royalty free project-specific license to such software for the use, operation or maintenance at Buyer's site of any Equipment purchased hereunder to which the software is a necessary component. Buyer agrees not to copy, sub-license, translate, transfer, reverse engineer, or decode the software.

Seller shall indemnify and hold harmless Buyer from any rightful claim of any third party that any Equipment or Service infringe a patent in effect in the USA, or country of delivery (provided there is a corresponding patent issued by the USA), or USA copyright or copyright registered in the country of delivery. If the Buyer notifies the Seller promptly of the receipt of any such claim, does not take any position adverse to the Seller regarding such claim and gives the Seller information, assistance and exclusive authority to settle and defend the claim, the Seller shall, at its own expense and choice, either (i) settle or defend the claim and pay all damages and costs awarded in it against the Buyer, or (ii) procure for the Buyer the right to continue using the Equipment or Service, or (iii) modify or replace the Equipment or Service so that it becomes non-infringing, or (iv) remove the infringing Equipment and refund the price. The above paragraph shall not apply to any misuse of Equipment or Equipment which is manufactured to the Buyer's design, or to alleged infringement arising from the combination, operation, or use of any Equipment or Services with other equipment or services when such combination is part of any allegedly infringing subject matter. The foregoing list of sub-sections (i), (ii), (iii), and (iv) and related terms state the entire liability of the Seller for intellectual property infringement by any Equipment or Service.

14. limitations on liability. Notwithstanding anything else contained in this Agreement, to the maximum extent permitted by law, and regardless of whether a claim is based in contract (including warranty or indemnity), extra-contractual liability, tort (including negligence or strict liability), statute, equity or any other legal theory:

- (a) THE TOTAL LIABILITY OF THE SELLER AND OF ITS INSURER FOR ALL CLAIMS ARISING OUT OF OR RELATING TO THE PERFORMANCE OR BREACH OF THIS AGREEMENT OR USE OF ANY EQUIPMENT OR SERVICES SHALL NOT EXCEED THE TOTAL PRICE PAID BY BUYER UNDER THIS AGREEMENT OR (IN THE CASE OF AN AGREEMENT FOR SERVICES WITH A TERM OF MORE THAN ONE YEAR) THE ANNUAL PRICE PAYABLE BY BUYER UNDER THIS AGREEMENT;
- (b) IN NO EVENT SHALL SELLER BE LIABLE FOR ANY LOSS OF PROFIT OR REVENUES, LOSS OF PRODUCTION, LOSS OF USE OF EQUIPMENT OR SERVICES OR ANY ASSOCIATED EQUIPMENT, INTERRUPTION OF BUSINESS, COST OF CAPITAL, COST OF REPLACEMENT WATER OR POWER, DOWNTIME COSTS, INCREASED OPERATING COSTS, CLAIMS OF BUYER'S CUSTOMERS FOR SUCH DAMAGES, OR FOR ANY SPECIAL, CONSEQUENTIAL, INCIDENTAL, INDIRECT, PUNITIVE OR EXEMPLARY DAMAGES;
- (c) SELLER'S LIABILITY SHALL END UPON EXPIRATION OF THE APPLICABLE WARRANTY PERIOD, PROVIDED THAT BUYER MAY CONTINUE TO ENFORCE A CLAIM FOR WHICH IT HAS GIVEN NOTICE PRIOR TO THAT DATE BY COMMENCING AN ACTION OR ARBITRATION, AS APPLICABLE UNDER THIS AGREEMENT, BEFORE EXPIRATION OF ANY STATUTE OF LIMITATIONS OR OTHER LEGAL TIME LIMITATION BUT IN NO EVENT – TO THE EXTENT PERMITTED BY APPLICABLE LAW – LATER THAN FIVE (5) MONTHS AFTER EXPIRATION OF SUCH WARRANTY PERIOD.

For the purposes of this article, "Seller" shall mean Seller, its affiliates, subcontractors and suppliers of any tier, and their respective agents and employees, individually or collectively. If Buyer is supplying Seller's Equipment or Services to a third party, Buyer shall require the third party to agree to be bound by this article. If Buyer does not obtain this agreement for Seller's benefit for any reason, Buyer shall indemnify and hold Seller harmless from all liability arising out of claims made by the third party in excess of the limitations and exclusion of this article.

15. termination. This Agreement and any performance pursuant to it may be terminated by either Party, and the consequences of such termination shall be as set out in the next paragraph, if the other Party

- (a) becomes insolvent, makes an assignment for the benefit of its creditors, has a receiver or trustee appointed for the benefit of its creditors, or files for protection from creditors under any bankruptcy or insolvency laws; or
- (b) fails to make any payment when due or to establish any payment security required by this Agreement or commits a material breach or defaults in its material obligations under this Agreement, and such default is not cured within thirty (30) days of written notice from the other Party.

Upon the termination of this Agreement by Buyer for cause (i) Seller shall reimburse Buyer the difference between that portion of the Agreement price allocable to the terminated scope and the actual amounts reasonably incurred by Buyer to complete that scope, and (ii) Buyer shall pay to Seller (a) the portion of the Agreement price allocable to Equipment completed, and (b) amounts for Services performed before the effective date of termination. Upon the termination of

this Agreement by Seller for cause Buyer shall pay to Seller within thirty (30) days of receipt of invoice the price of all Equipment or Services delivered at the date of termination, plus an amount equal to all costs and expenses incurred in the engineering, sourcing, financing, procurement, manufacture, storage and transportation of the Equipment including materials, work in progress and any cancellation charges assessed against Seller by Seller's suppliers including reasonable overhead and profit on all such costs and expenses. Alternatively, if any schedule of termination payments has been agreed between the Parties, Buyer shall pay to Seller within thirty (30) days of receipt of invoice the amounts set out in that schedule.

Seller shall have the right to suspend performance upon written notice to Buyer in any case where Seller would have the right to terminate the Agreement under this article, without prejudice to Seller's right to terminate this Agreement for cause. Any cost incurred by Seller in accordance with any such suspension (including storage costs) shall be payable by Buyer upon submission of the Seller's invoice(s). Performance of the Seller's obligations shall be extended for a period of time reasonably necessary to overcome the effects of such suspension.

16. governing law, dispute resolution. This Agreement shall be governed by the substantive laws of the State of Maryland. In the event of a dispute concerning this Agreement, the complaining Party shall notify the other Party in writing thereof. Management level representatives of both Parties shall meet at an agreed location to attempt to resolve the dispute in good faith. Should the dispute not be resolved within thirty (30) days after such notice, the complaining Party shall seek remedies exclusively through arbitration. The seat of arbitration shall be the federal district court closest to the Buyer and the rules of the arbitration will be the Commercial Arbitration Rules of the American Arbitration Association, which are incorporated by reference into this article.

Notwithstanding the foregoing, each Party shall have the right to commence an action or proceeding in a court of competent jurisdiction, subject to the terms of this Agreement, in order to seek and obtain a restraining order or injunction to enforce the confidentiality intellectual property provisions set forth in the first two paragraphs of article 13; nuclear use restrictions set forth in article 17, or to seek interim or conservatory measures not involving monetary damages.

17. no nuclear use. Equipment and Services sold by Seller are not intended for use in connection with any nuclear facility or activity, the Buyer warrants that it shall not use or permit others to use the Equipment or Services for such purposes, without the advance written consent of Seller. If, in breach of this, any such use occurs, Seller (and its parent, affiliates, suppliers and subcontractors) disclaims all liability for any nuclear or other damage, injury or contamination, and, in addition to any other rights of Seller, Buyer shall indemnify and hold Seller (and its parent, affiliates, suppliers and subcontractors) harmless against all such liability.

18. export control. Seller's obligations are conditioned upon Buyer's compliance with all USA and other applicable trade control laws and regulations. Buyer shall not trans-ship, re-export, divert or direct Equipment (including software and technical data) other than in and to the ultimate country of destination declared by Buyer and specified as the country of ultimate destination on Seller's invoice.

19. changes. Each Party may at any time propose changes in the schedule or scope of Equipment or Services. All changes to the Equipment or Services shall be subject to mutual agreement via a written change order or variation, which shall only become effective once signed by both Parties. The scope, Agreement price, schedule, and other provisions will be equitably adjusted to reflect additional costs or obligations incurred by Seller resulting from a change, after Seller's proposal date, in Buyer's site-specific requirements or procedures, or in industry specifications, codes, standards, applicable laws or regulations. It shall be acceptable and not considered a change if Seller delivers Equipment (including Equipment replacement under warranty) that bears a different, superseding or new part or version number compared to the part or version number listed in the Agreement, provided that in no circumstance shall this affect any other of Seller's obligations including those set forth in article 6.

20. conflicts; survival, assignment. If there is any conflict between this Agreement and any written proposal or quotation provided by Seller, then the terms and conditions set forth in this Agreement shall prevail. If any term or condition of this Agreement or any accompanying terms and conditions are held invalid or illegal, then such terms and conditions shall be reformed to be made legal or valid, or deleted, but the remaining terms and conditions shall remain in full force and effect, and this Agreement shall be interpreted and implemented in a manner which best fulfills Parties' intended agreement. Those provisions which by their nature remain applicable after termination shall survive the termination of this Agreement for any reason. Seller may assign or novate its rights and obligations under the Agreement, in whole or in part, to any of its affiliates or may assign any of its accounts receivable under this Agreement to any party without Buyer's consent, and the Buyer hereby agrees, by signing this Agreement, to such assignment and to execute any document that may be necessary to complete Seller's assignment or novation. This Agreement shall not otherwise be assigned by either Party without the other Party's prior written consent, and any assignment without such consent shall be void.

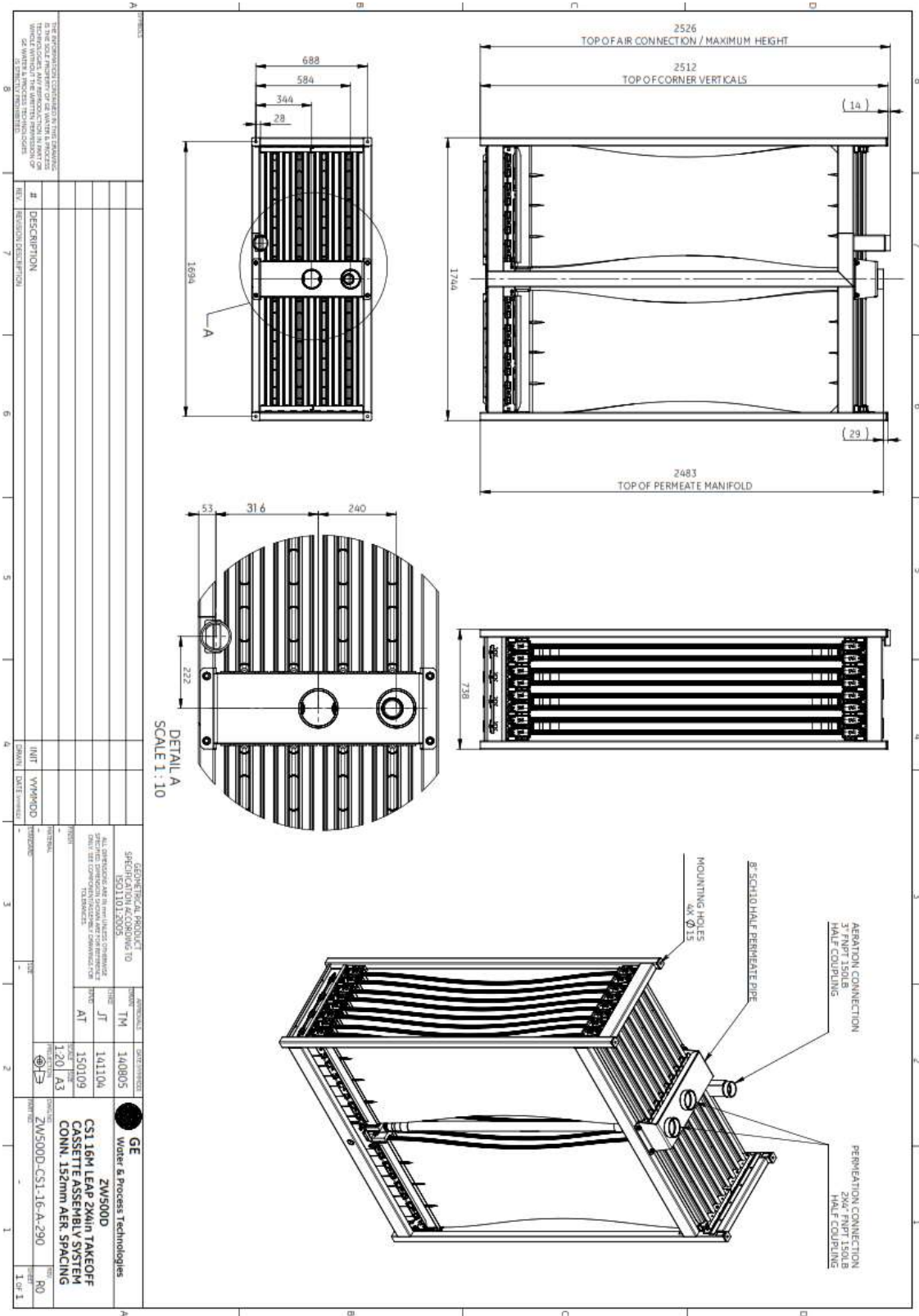
Seller may (i) manufacture and source the Equipment and any part thereof globally in the country or countries of its choosing; and (ii) may subcontract portions of the Services, so long as Seller remains responsible for such.

21. no third party beneficiary. Except as specifically set forth in the article entitled "Limitations on Liability" and "No Nuclear Use", this Agreement is not intended to, and does not, give to any person who is not a party to this Agreement any rights to enforce any provisions contained in this Agreement.

22. entire agreement. This Agreement embodies the entire agreement between Buyer and Seller and supersedes any previous documents, correspondence or agreements between them. No modification, amendment, revision, waiver, or other change shall be binding on either Party unless agreed in writing by the Party's authorized representative. Any oral or written representation, warranty, course of dealing, or trade usage not specified herein shall not be binding on either Party. Each Party agrees that it has not relied on, or been induced by, any representations of the other Party not contained in this Agreement

attachment b ZW500D 16M cassette drawing

ZW500D 16M LEAPmbr system connection drawing (1 page – attached)



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DIVISION 00 – BIDDING AND CONTRACT REQUIREMENTS

SECTION 00340

MOBILE HOLLOW FIBER TREATMENT SYSTEM

CONFIDENTIAL AND PROPRIETARY

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Proposal for

Worcester County Department of Public Works

Berlin, MD

Submitted to:

Worcester County Department of Public Works
11401 Grays Corner Road, Riddle Farm Wastewater Treatment Plant
Berlin, MD, 21811-2467
Attention: Shane Odegaard

Proposal #551006, Version 2

Submitted by:

Veolia WTS Services USA, Inc.
Brad Gladfelter
Sales Account Manager
(443) 528-8750
bradly.gladfelter@veolia.com

SECTION 00340

MOBILE HOLLOW FIBER TREATMENT SYSTEM

CONFIDENTIAL AND PROPRIETARY



SUEZ Water Technologies & Solutions is now part of Veolia. This change will not impact your contract or the team supporting your business. We will be changing our legal entity name, but this will not change in any way the tax identification number, or our banking information. The detail of changes to the legal entity name will be communicated separately.

Confidential and Proprietary Information

Veolia submits the information contained in this document for evaluation by Customer only. Customer agrees not to reveal its contents except to those in Customer's organization necessary for evaluation. Copies of this document may not be made without the prior written consent of Veolia Management. If the preceding is not acceptable to Customer, this document shall be returned to Veolia.

Validity

This proposal is valid for Thirty (30) days from proposal date. In absence of additional proposals pricing will be subject to Price Modification clause one year from proposal date.

Trademark Notification

The following are trademarks of Water Technologies and Solution and may be registered in one or more countries:

+100, ABMet, Absolute.Z, Absolute.Za, AccuSensor, AccuTrak, AccuTrak PLUS, ActNow, Acufeed, ALGAECAP, AmmCycle, Apogee, APPLICATIONS ATLAS, AquaFloc, AquaMax, Aquamate, Aquaplex, AquaSel, Aquatrex, Argo Analyzer, AutoSDI, BENCHMARK, Betz, BetzDearborn, BEV Rite, BioHealth, BioMate, BioPlus, BIOSCAN, Bio-Trol, Butaclean, Certified Plus, CheckPoint, ChemFeed, ChemSensor, ChemSure, CHEX, CleanBlade, CLOROMAT, CoalPlus, COMP-METER, COMP-RATE, COMS (Crude Overhead Monitoring System), Continuum, CopperTrol, CorrShield, CorTrol, Custom Clean, Custom Flo, Cyto3, DataGuard, DataPlus, DataPro, De:Odor, DELTAFLOW, DEOX, DeposiTrol, Desal, Dianodic, Dimetallic, Dispatch Restore, Durasan, DuraSlick, Durasolv, Duratherm, DusTreat, E-Cell, E-Cellerator, ELECTROMAT, Embreak, EndCor, EXACT, FACT-FINDER, Feedwater First, Ferrameen, Ferroquest, FilterMate, Fleet View, FloGard, Flotrex, Flotronics, FoamTrol, FoodPro, Fore4Sight, ForeSight, FRONTIER, FS CLEAN FLOW, FuelSolv, Full-Fit, G.T.M., GenGard, VeoliaWaterSource, Glegg, Heat-Rate Pro, High Flow Z, HPC, HPD Process, HyperSpense, Hypure, Hytrex, InfoCalc, InfoScan, InfoTrac, InnovOx, InSight, IONICS, IONICS EDR 2020, IPER (Integrated Pump & Energy Recovery), iService, ISR (Integrated Solutions for Refining), JelClever, KlarAid, Kleen, LayUp, Leak Trac, Leakwise, LEAPmbr, LEAPprimary, Learning Source, LOGIX, LoSALT, M-PAK, MACcarrier, Mace, Max-Amine, MegaFlo, Membrex, MemChem, Memtrex, MerCURxE, MetClear, MiniWizard, MK-3, MOBILEFLOW, MobileRO, Modular Pro, ModuleTrac, MonitAll, Monitor, Monitor Plus, Monsal, MP-MBR, MULTIFLOW, Muni.Z, NEWater, NGC (Next Generation Cassette), Novus, NTBC (Non Thermal Brine Concentrator), OptiGuard, OptiSpense, OptiTherm, Osmo, Osmo PRO, Osmo Titan, Osmonics, Pacesetter, PaceSetter, Petroflo, Petromeen, pHlimPLUS, PICOPORE, PlantGuard, PolyFloc, PowerTreat, Predator, PRO E-Cell, Pro Elite, ProCare, Procera, ProChem, Proof Not Promises, ProPAK, ProShield, ProSolv, ProSweet, Purtrex, QSO (Quality System Optimization), QuickShip, RCC, RE:Sep, Rec-Oil, Recurrent, RediFeed, ReNEW, Renewell, Return on Environment, RMS (Rackless Modular System), ROSave.Z, SalesEdge, ScaleTrol, SeaPAK, SeaPRO, SeaSMART, Seasoft, SeaTECH, Selex, Sensicore, Sentinel, Sepa, Sevenbore, Shield, SIDTECH, SIEVERS, SmartScan, SoliSep, SolSet, Solus, Spec-Aid, Spectrus, SPLASH, Steamate, SteriSafe, Styrex, SUCROSOFT, SUCROTEST, Super Westchar, SuperStar, TFM (Thin Film Membrane), Terminator, Thermoflo, Titan RO, TLC, Tonkaflo, TraveLab, Trend, TruAir, TrueSense, TurboFlo, Turboline, Ultrafilic, UsedtoUseful, Vape-Sorber, VeriFeed, VersaFlo, Versamate, VICI (Virtual Intelligent Communication Interface), V-Star, WasteWizard, WATER FOR THE WORLD, Water Island, Water-Energy Nexus Game, WaterGenie, WaterNODE, WaterNOW, WaterPOINT, WellPro.Z, XPlat, YieldUp, Z-BOX, Z-MOD, Z-PAK, Z-POD, ZCore, ZeeBlok, ZeeLung, ZeeWeed, ZENON, and Z.Plex.



September 21, 2022

Dear Valued Customer,

As you know, SUEZ – Water Technologies & Solutions was acquired by Veolia Group on January 18, 2022. Due to ongoing regulatory investigations, we have been operating independent from the rest of Veolia during this time. I'm pleased to tell you that as of today, we are officially able to begin integrating into Veolia Group and will operate as Veolia Water Technologies & Solutions.

While our name is now different, our relationship with you will not change. Your Water Technologies & Solutions contacts remain the same and will continue to provide you with the same level of support and service that you are accustomed to.

This change will not impact your contract or the team supporting your business. We will be changing our legal entity name, but this will not change in any way the tax identification number, or our banking information. The detail of changes to the legal entity name will be communicated separately. Please forward to your respective accounting, sourcing and legal departments.

We are very excited about the future of this business, and our customers are an integral part of that future. Thank you for your continued trust and support. Feel free to contact us if you have any questions or visit our website at www.watertechnologies.com.

Best regards,



Yuvbir Singh
CEO
Veolia Water Technologies & Solutions

1. Technical & Engineering Details

1.1 Basis of Design

This proposal is offered based on the following water design values from municipal wastewater to be used for wastewater treatment for discharge.

1.2 Influent Water Quality

The design solution proposed is based on the values below. All values are as mg/l as ion unless otherwise stated.

Cations		Anions		Other	
Total Hardness, as CaCO3	N/R	Alkalinity, "P", as CaCO3	N/R	Specific Conductance, at 25°C, µS/cm	N/R
Calcium, Total	N/R	Alkalinity, "M", as CaCO3	N/R	Total Dissolved Solids (TDS)	102.7
Magnesium, Total	N/R	Chloride	N/R	pH, standard units	6-8
Sodium	N/R	Sulfur, Total, as SO4	N/R	Total Suspended Solids	N/R
Potassium	N/R	Nitrate, as NO3	6.5	Turbidity, NTU	N/R
Ammonia, as NH3	26.75	Reactive Silica, Total, as SiO2	N/R	Silt Density Index (SDI15)	N/R
Barium, Total	N/R	Colloidal Silica, Total, as SiO2	N/R	Total Organic Carbon (TOC), as C	N/R
Strontium, Total	N/R	Phosphate, Total, as PO4	N/R	Dissolved Organic Carbon (DOC)	N/R
Copper, Total	N/R	Phosphate, Total Inorganic, as PO4	N/R	Color, TCU	N/R
Aluminum, Total	N/R	Phosphate, Ortho-, as PO4	N/R	Total Chlorine	N/R
Manganese, Total	N/R	Fluoride	N/R	Free Chlorine	N/R
Iron, Total	N/R	Organic N	7.88	Carbon Dioxide	N/R
Iron, Dissolved	N/R	Total Kjeldahl Nitrogen	34.63	Fats, Oil and Grease	N/D*
		Total Nitrogen	41.13	BTEX	N/D*
				BOD	166.2

Source of Test and Date	Wastewater Source, 3/2/2023
Feed Water Source	Wastewater

Notes:

1. N/R = data for this parameter has not been reported, and will be assumed to be 0 (zero)
2. Parameters marked with an asterisk have been assumed. Please confirm these values.
3. BTEX = benzene, toluene, ethyl benzene, and xylene.
4. Influent MLSS of 5300 mg/L and 5,500 mg/L in the membrane tank is assumed.

1.3 Influent Water Flow Data

Flow rate, pressure and temperature required at inlet to the equipment.

	Minimum	Maximum
Inlet Flow Rate, gpd	101,000	102,000
Pressure, psi *	10	80
Temperature, °F	50	90
Pretreatment	Customer-owned 1 mm screen, EC tank, and bioreactor tanks	

* Pressure must be measured under flowing conditions at the inlet to the Veolia equipment.

1.4 Product Water Quality and Flow Data

The following performance parameters are expected upon equipment start-up, based on the data listed in the influent quality table and design sections above.

Maximum Flow Rate, gpd	100,000
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Veolia will only guarantee meeting water quality as specified in Section 1.4 Product Water Quality table. Customer is responsible for fitness of use characteristics to include, but not limited to, final discharge to the environment. Furthermore, the customer is responsible for operation of the mobile unit on a continuous basis. Customer is to ensure compliance with applicable regulations.

1.5 Influent Water Variability

In the event that the influent water exceeds the specifications used in engineering this proposal or the water source changes, the ability of the water treatment system to produce the designed treated water quality and/or quantity may be impaired. If influent water is provided to the system, which does not meet the specifications shown above, and the equipment therefore does not meet the listed product water characteristics, the total value of the contract shall be paid in full as described in this proposal. Veolia shall endeavor to restore the full product water quality as soon as possible after the influent conditions have been restored. Any additional costs incurred by Veolia resulting from a change in influent conditions, including, but not limited to any repair and replacement of damaged equipment and any additional costs incurred, shall be fully reimbursed to Veolia.

1.6 Operational Basis

Percent Uptime	95
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Down time for routine maintenance such as membrane cleaning, cartridge filter change outs, and pump maintenance must be allowed. All planned maintenance outages will be discussed with the site. They will be scheduled to have minimal impact on site requirements.

1.7 Wastewater Streams

The following streams are waste lines that will derive from the proposed equipment. The customer must dispose of all these streams and provide the required connections to drain as specified in Customer Scope of Supply section. Connection details of each line can be found in the Veolia Scope of Supply section where the specification for each supplied unit is detailed.

Waste Line	Flow Rate or Volume	Additional Comments
Sludge Waste Rate	850 gpd	Gravity drain, no back pressure on this line
UF CIP Reject	50 gpm, intermittent	Up to 1,000 ppm of free chlorine Up to 2,000 ppm of citric acid solution
UF Module Drain Reject	TBD	Only during commissioning phase, if required
UF Preservative Solution	TBD	Sodium hypochlorite solution. For more information see section Preservative Chemicals.

1.8 Chemical Usage

These are estimates only and will vary with changes to influent water quality.

Chemical	Usage
Sodium hypochlorite	As needed for membrane cleaning
Citric Acid	As needed for membrane cleaning

1.9 Preservative Chemicals

Prior to shipment, the UF modules are filled with a preservative solution of sodium hypochlorite that protects the membrane fibers until they are ready for use. After the modules have been installed, this solution must be completely flushed from the modules before production can begin. The flushing procedure will create a byproduct permeate with a high TOC content that is unsuitable for normal discharge into the environment (example: down a drain connected to a municipal sewer system). As a result, when flushing a newly installed module, direct all permeate to a suitable container that can then be sent for proper disposal.

UF membranes that are to be taken offline for longer than two days must be preserved in order to prevent biological growth within the modules. For storage periods of up to approximately 1 week, filling the modules with water containing sodium hypochlorite at a minimum residual concentration of 1-2 mg/L is adequate (modules have a maximum chlorine tolerance of 1,000 mg/L). For storage periods longer than 1 week, a residual sodium hypochlorite concentration of 15 mg/L is required.

2. Commercial Offer

2.1 Pricing Table

Pricing for the proposed equipment, consumables, and / or services is summarized in the table below. All pricing is based on the operating conditions and influent water analysis that are detailed in the Technical & Engineering Details section of this proposal. **See Pricing Notes below for pricing clarification.**

Qty	Description	Price	Units
Equipment Preparation Charges			
1	Mobile Hollow Fiber System (Mobile MBR UF Process Container)		Per unit ordered
Equipment Service Charges			
1	Mobile Hollow Fiber System (Mobile MBR UF Process Container)		Per month, per unit, 12-month minimum
1	Mobile Hollow Fiber System (Mobile MBR UF Process Container)		Per month, per unit, 1-month minimum
Consumables			
	Citric Acid	By customer	
	Sodium Hypochlorite	By customer	
	Additional chemicals by Veolia		
Additional Charges			
	Surcharge, Fuel	See Appendix D	
Field Service			
TBD	FSR coverage, including transportation and per diem, startup/supervision/training only, no operation		Per hour, per person, minimum 8 hours per day
Freight			
	Delivery and removal, by SUEZ		Per mile, per tractor, round trip (plus fuel surcharge)
	Delivery and removal, by others		

Optional Items

Qty	Description	Unit Price	Extended Price
1	Fire hose, 2 1/2" NST, 50' sections (3109224)		
1	Fire hose, double female, 2-1/2" (3104781)		

2.2 Pricing Notes

1. No credit for partially used or unused units. Exclusive of equipment service, FSR, and freight charges.
2. Exchanges of MobileFlow or MultiFlow units during the term of the contract will also be charged at the freight rate as quoted above. Additional freight charges, including, but not limited to, expedited freight, shipment during public holidays or any special circumstances shall be charged at extra.
3. All prices quoted are in USD.
4. The customer will pay all applicable local, state, provincial, or federal taxes and duties.
5. The equipment delivery date, start date, and date of commencement of operations are to be negotiated.
6. Commercial terms and conditions shall be in accordance with Veolia's Standard Terms and Conditions of Contract.
7. This proposal and the rates provided herein are subject to final site, environmental, and financial due diligence by Veolia.
8. This proposal supersedes all previous proposals and correspondence.
9. Equipment Service Charges to commence on actual delivery date at site.
10. The FSR coverage rate is to be billed for hours on site. Additional charges shall apply for standby FSR due to customer delays.
11. Tractors must travel both ways for both delivery and pickup of equipment. Therefore, freight will be charged for both the outbound and return trip for the delivery of the equipment, and for both the outbound and return trips for the pickup of the equipment.
12. PRICE MODIFICATION - Veolia WTS Services USA, Inc. shall adjust the service rates at each annual anniversary date. The anniversary date shall be based on proposal issue date. The prices shall be adjusted by the greater of: (i) 3%; or (ii) a combination of two BLS indices in which 50% of the payment amount shall be adjusted by an amount equal to the percentage increase of the Index for Chemicals and Allied Products (WPU06) plus 50% of the payment amount shall be adjusted by an amount equal to the percentage increase of the Index for Total Private Average Hourly Earnings of Production - Workers Not Seasonally Adjusted (CEU0500000008) (both indexes as reported by the US Dept. of Labor - Bureau of Labor Statistics). All calculations shall be made using the most recent annual index values as reported by the US Dept. of Labor-Bureau of Labor Statistics at <http://data.bls.gov/cgi-bin/surveymost?wp>. Veolia WTS Services USA, Inc. retains the right to implement reasonable surcharges, or to adjust the service rates as applicable in the event of extraordinary cost increases for materials, parts, chemicals, etc. used in performance of the services. Customer shall adjust, or modify, the Purchase Order in a manner that adequately funds Veolia WTS Services USA, Inc.'s continuous provision of authorized services as adjusted in accordance with these terms.

2.3 Field Service Coverage

The FSR(s) will work on site in accordance with local working time regulations. The FSR will manage their time such that they can respond to required callouts within their allowable working time. If, however they are unable to complete all the required tasks within the allocated time then additional FSR cover may be required at a cost to Worcester County Department of Public Works.

2.4 Term and Service Period

This Agreement shall enter into effect on 05/8/2023 and shall continue in full force and effect until the Equipment leaves the Site (the "Term" of this Agreement).

This Agreement may be renewed prior to the expiration of the above stated Service Period by mutual agreement between the parties. Upon such renewal, all references made to the Service Period shall be

deemed to include both the in the foregoing referred to initial Service Period as well as any renewal Service Periods as a whole. Notice for renewal shall be given in writing by Customer not less than seven (7) days prior to the expiration of the ongoing Service Period, otherwise the Service Period shall automatically terminate and the Equipment be returned to Veolia in accordance with the terms and conditions of this Agreement.

2.5 Invoicing and Payment Terms

Payment terms are net 30 days from date of invoice.

2.6 Conditional Offering

Customer understands that this proposal has been issued based upon the information provided by customer, and currently available to, Veolia at the time of proposal issuance. Any changes or discrepancies in site conditions (including but not limited to system influent water characteristics, changes in environmental, health, and safety (EH&S) conditions, and/or newly discovered EH&S concerns), Customer financial standing, Customer requirements, or any other relevant change, or discrepancy in, the factual basis upon which this proposal was created, may lead to changes in the offering, including but not limited to changes in pricing, warranties, quoted specifications, or terms and conditions. Veolia's offering in the proposal is conditioned upon verification of Customer's EH&S conditions, financial standings, and other information.

2.7 Insight Data Transmission

Veolia equipment may be outfitted with InSight, a Knowledge Management Solution, for the collection of performance data from select equipment. This data enables our customers to achieve success and overcome operational challenges including avoiding operational interruptions, reducing operating and maintenance costs including chemicals and energy, and optimizing operator efficiency. In the event Veolia's equipment is outfitted with InSight, data transmission will occur wirelessly, requiring no communication wires, allowing quick setup and transmission of valuable operational data.

2.8 Decommissioning

Customer is responsible for handling all product and disposal of waste streams from the process, including any activated sludge. At job's end, Customer must chemically clean any vessels and/or membranes using a potable water source before return to a Veolia facility. An inspection will be performed on all vessels before being returned in order ensure the trailer complies with DOT regulations. Customer shall be responsible for all damages to the equipment such that the unit is returned to normal operating condition.

3. Veolia Scope of Supply

The proposed treatment system consists of the components described in this section.

3.1.1 Mobile Hollow Fiber System

Model	ZW500D, Mobile MBR UF Process Container
Configuration	One Train 4 Cassette

Performance Data

Average Product Flow	100,000 gpd max
Feed Flow	70-75 gpm
Design Recovery	90% to 95%
Design Temperature Range	35-90°F

Installation and Utility Requirements

Feed Water Connection	4 inch FF flanges, stainless, 8 PSIG TO 20 PSIG
Product Water Connection	6 inch RF flange, stainless, <15 PSI
Backwash Connection	6 inch RF flange, Stainless, <15PSI
Permeate Tank Drain Connection	6 inch ANSI flange
Air Requirement	17.3 SCFM@175PSIG 1Instrument Air compressor Installed in the container, 760SCFM @5 PSIG Blower Installed in container
Inlet Water Pressure	10 psig (69.9 kPa) minimum 80 psig (551.6 kPa) maximum (no pressure spikes permitted above this value)
Power	187A @ 380 (400) VAC and 162 amps @ 460(480) VAC
Dimensions (LxWxH)	40'L x 8.0'W x 9.5'H (40' HC ISO Container) Top Head Removable
Shipping Weight Estimate	50,000 LBS / [22,680 Kg]
Operating Weight Estimate	102,500 LBS / [46595 Kg]

Features Included

- Online raw water turbidity meter
- Online Filtrate (permeate) turbidity meter
- Manual raw water strainer included
- Fine screen required of 1.6 mm

Order entry information

SAP Description	UF,ZW500D
Prep Part Number	TBD
Rental Part Number	TBD

4. Customer Scope of Supply

All delivery or services not specified in the Veolia Scope of Supply are included in the Customer Scope of Supply.

4.1 Safety and Environmental

- First aid and emergency medical response
- Eyewash and safety showers in the water treatment area
- Chemical spill response
- Security and fire protection systems per local codes
- Environmental use and discharge permits for all chemicals/waste water streams at the customer facility either listed in this document or proposed for use at a later date
- Any special permits required for Veolia or Customer employees to perform work related to the water treatment system at the facility
- All site testing, including soil, ground and surface water, air emissions, etc.
- Disposal of all solid and liquid waste from the Veolia System
- The Customer will identify and inform Veolia personnel of any hazards present in the work place that could impact the delivery of Veolia's scope of supply and agrees to work with Veolia to remove, monitor, and control the hazards to a practical level.
- The Customer will provide training to Veolia's personnel on all relevant and standard company operating procedures and practices for performing work on site. Such training programs may include, but are not limited to, general environmental health and safety (EHS), HAZOP, fire protection, drug testing, incident notice, site conduct, standard first aid, chemical receiving, electrical safety, etc. Customer will provide a certificate of training for Veolia personnel. This program will be fully documented, training materials will be provided, and attendance list will be kept.

4.2 Jobsite and Installation Review

- Review of Veolia supplied equipment drawings and specifications
- Overall plant design, detail drawings of all termination points where Veolia equipment or materials tie into equipment or materials supplied by others
- All easements, licenses and permits required by governmental or regulatory authorities in connection with the supply, erection and operation of the system
- All applicable civil design and works, including any building, site preparation, grading, excavations, foundations, and trenches and accessories
- All electrical labor and supplies leading up to and from the jobsite and between equipment, including power supplies and cables, control cables, fittings, conduit, supports, cable trays, wire and hardware, and air conditioned panels as required for installation and ongoing operations
- All labor and supplies leading up to and from the jobsite and between equipment, including fittings, conduit, supports, cable trays, wire and hardware required to appropriately ground / earth the equipment as required for installation and ongoing operations
- All mechanical labor and supplies leading up to and from the jobsite including connecting and interconnecting piping, heat tracing or winterization of equipment (if required), fittings, conduit, pipe supports, and hardware as required for installation and ongoing operations
- All instrumentation, control and automatic pneumatic valves including, but not limited to, air / sample line tubing, fittings, conduit, supports, isolating valves leading up to jobsite and between Veolia-supplied skids and hardware as required for installation and ongoing operations

- Loading, unloading, lifting, positioning and transportation of the equipment and materials required for Veolia to perform the duties outlined in the Veolia Scope of Supply to the jobsite and/or warehouse
- All access structures (scaffolding) and mechanical lifting equipment (cranes, forklifts, and scissor lifts)
- Providing a suitable site/shelter for the placement of the proposed equipment, either inside appropriate housing, or outdoors. Note: electrical equipment, including the PLC, may require air-conditioned rooms to prevent overheating of sensitive electronic equipment, depending on climatic conditions.
- Storage of cassette / membranes / stacks on site. These must be stored in a sheltered area, protected from freezing, direct sunlight or extreme heat, and sealed as shipped until ready for use. Storage should be in a dark, dry, level area, out of direct sunlight, and at a temperature of 5-30°C (39-86°F). It is recommended that the cassettes / membranes / stacks not be stored longer than necessary prior to installation. Coordinate with Veolia for appropriate shipment times. Maximum storage duration of a cassette / membrane / stack is 8 / 12 / 3 months from the date of shipment. If these timescales are exceeded Veolia can provide instruction to extend the storage period.
- Bulk chemical storage and tanks, including secondary containment in accordance with local codes
- Timely disposal of unused chemicals
- Receiving, off-loading, logging, and storing all chemicals and materials in accordance with Manufacturer's recommendation that are shipped to the site
- Compressed, oil and grease free instrument air for pneumatic valves and instruments
- Equipment anchor bolts if required.
- Telephone / fax / modem access for Veolia staff while on site if required.
- Laboratory services, operating and maintenance personnel during equipment check out, start-up and operation if required.
- Any customer supplied hosing, interconnections, pipework must be suitable for operating pressures of up to 10 bar (145 psi). For the MPAK, the feed line must be hard pipe or non-collapsible hose.
- Pressure relief valving upstream of Veolia equipment to stop pressure spikes (water hammer) from closing / stopping of downstream valves / pumps. Veolia can supply this if requested.

4.3 Start-Up, Commissioning, and De-Commissioning

- Installation and removal of temporary screens (1 mm mesh / 0.5 mm mesh) on all process lines entering the membrane system / basins to prevent membrane damage (for UF systems only)
- Flushing and disinfection of all piping and membrane tanks (for UF systems only)
- Verification of removal of all residual debris from construction
- Provide an uninterrupted influent water and electrical supply to Veolia for approximately 2 days in order to allow the commissioning of the supplied equipment
- Supply raw materials, chemicals and utilities during start-up and operation
- Telephone / fax / modem access for Veolia staff while on site if required.
- Laboratory services, operating and maintenance personnel during equipment checkout, start-up and operation
- Provide an uninterrupted influent water and electrical supply to Veolia for approximately 2 days in order to allow the decommissioning of the supplied equipment
- Provide compressed air and electricity in order to power site tools during installation assembly

4.4 Facility Management

- Warehouse storage space and facilities, as are available at the site, and are reasonably appropriate to store parts, consumables, tools, etc. in accordance with manufacturers' recommendations. Such warehouse storage space will be a segregated area, secured and protected from adverse climate

as may be reasonably required. Customer will be responsible for risk of loss of Veolia's parts while in storage at the site. Customer will maintain Veolia's parts stored at the site free and clear of any and all liens of Customer and Customer's lenders, bondholders, contractors, and other creditors of any nature.

- Free access and egress of the facility for all authorized work for Veolia staff
- Workshop facilities with standard workshop tools and equipment, as is reasonably appropriate, that are necessary to meet the repair and maintenance requirements of the system. Such equipment includes, but is not limited to, benches, vices, drill press, electric saws, hand tools, power tools, pneumatic tools, etc.
- All access structures (scaffolding) and mechanical lifting equipment (cranes, forklifts, and scissor lifts)
- Provide a location with suitable load bearing at Customer's facilities required for the Equipment and the operation thereof in its usual and customary manner and in such a way as to permit Veolia to furnish the Service
- Adequate illumination and emergency lighting for all areas in which Veolia staff will be executing the scope of supply
- Equipment for movement of chemical drums, totes, and resin, as is reasonable
- All site utilities such as raw water at appropriate pressure and flow rate, instrument quality air, potable water, and power required for operation of the proposed equipment included in this scope of supply as specified by Veolia in this Agreement
- Secure office space adjacent to the work area at the site with access to typical office equipment and amenities
- Provision of welfare facilities, such as clean toilets, washing facilities, drinking water, canteen, restrooms, etc.

Appendix A. Acceptance

A.1 How to place an order

To ensure accurate and prompt order entry, product delivery, billing and accounts receivable processing, please ensure your Purchase Order contains the following information:

1. **Legal Entity:** Please identify Veolia WTS Services USA, Inc. as the ‘Seller’ on any Purchase Order(s).

Legal Entity:	Veolia WTS Services USA, Inc. 4545 Patent Road, Norfolk VA 23502 USA
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2. **Submit:** Veolia requires a hard copy of the PO with full customer and order details – by postal mail, e-mail, or fax. Communicate your PO to our central order processing department at:

E-Mail:	vtc.vwts.po.all.groups@veolia.com
Fax:	(757) 855-9631
Postal Mail:	Veolia WTS Services USA, Inc. 4545 Patent Road, Norfolk VA 23502 USA

3. **Details:** Ensure your Purchase Order contains the following information:

- a. **Proposal Number:** Please reference the Proposal # 551006, dated 07/11/2023, version 2 in any purchase orders.
- b. **Quantity** with units of measure (UOM) needs to be stated for each item listed in the PO.
- c. **Unit Price and / or Total Price** need to be stated alongside the information so that the Purchase Order can be cross checked against any proposal detail.
- d. **Delivery Location (Ship-to Address):** Please clearly define the delivery location.
- e. **Delivery Date:** Please include your requested delivery date in your PO. Upon receipt of the PO the requested delivery date will be reviewed, if that date is achievable based upon current factory loading it will be confirmed back to you via the confirmation information indicated on your PO, if the requested delivery date is not achievable a representative will contact you to discuss how to proceed. If a delivery date is not included in your PO the next available production capacity will be utilized and confirmed back to you.

4. **Execute:** Please sign and date below and include this page with your purchase order. Upon acceptance of the PO, Veolia will sign and date this page and return it to Worcester County Department of Public Works.

For:
Worcester County Department of Public Works

For:
Veolia WTS Services USA, Inc.

Name: _____

Name: _____

Signature: _____

Signature: _____

Date: _____

Date: _____

5. Invoicing and remittance

5.1 Preferred invoice delivery method

To ensure prompt invoice handling, please indicate your preference:

- Receive invoices by Postal Mail Service
- Upload invoices to portal or send via email

For Postal Mail submission, please provide all of this information:

Name of Recipient	
Job Title of Recipient	
Telephone Number of Recipient	
Email Address of Recipient	
Company	
Operations Specific Site Name	
Address Line 1	
Address Line 2	
City	
State	
Zip Code	

For Portal Upload or Email submission, please provide all of this information:

Instructions	For Portal Upload, please attach instructions
Web Link Address	
Name and Job Title of Help Contact	
Email Address of Help Contact	
Telephone Number of Help Contact	

5.2 Invoice processing

Please provide all information requested below.

Operation Lead, Engineer, Buyer who specified product and approves invoice for payment	
Person's Full Name	
Person's Title	
City	
Email Address	
Telephone Number	
Accounts Payable Administrative Contact	
Person's Full Name	
Person's Title	
City	
Email Address	
Telephone Number	
Person who "codes" or "links" invoice to PO, department, or category	
Person's Full Name	
Person's Title	
City	
Email Address	
Telephone Number	

5.3 Remittance of payments

In an effort to continuously serve you better, Veolia would like to request your assistance for the following.

Checks – please include all remittance details for payment, including invoice numbers and amounts, to the following lockbox:

Veolia WTS Services USA, Inc.
P.O. Box 418930
Boston, MA 02241-8930

EFT – please send all remittance details for payments, including invoice numbers and amounts, to vtc.vwts.remit-nam.all@veolia.com and include customer name and remit to total in the email subject line. Additionally, please inform us at vtc.vwts.remit-nam.all@veolia.com for any of the following important changes:

- Name, address, or contact information changes for your business
- Tax status changes, along with any relevant supporting forms
- Changes to how invoices are received, including location, method, and instructions

5.4 Future purchase orders

Please do not change payment terms on any future purchase orders. Please reflect the payment terms outlined in the contact / proposal signed by the two parties. Altered payment terms will not be honored.

Appendix B. Definitions

As used in this Agreement the terms below shall have the meanings as described below.

B.1 General Definitions

Agreement	shall mean the terms and conditions contained in this Proposal, including its Attachments as a whole
Delivery and Removal Charge	The rate specified, usually cost per mile, to deliver and remove the Veolia unit from the Customer's location. For either delivery or removal, the cost is computed based upon the distance from the Veolia service center to the Customer's location and the same mileage from the Customer's location to the Veolia service center (round trip).
Effluent Water	shall mean the treated water delivered from the Equipment to Customer's storage tank or point of use, resulting from the treatment of Influent Water under the terms and conditions of this Agreement
Equipment	shall mean the mobile treatment equipment as further detailed in the Veolia Scope of Supply section of this proposal
Field Service Representative	An employee of Veolia who has been professionally trained to operate and maintain Veolia's equipment. This employee is also able to provide a wide array of analytical services with Veolia supplied instruments
Influent Water	shall mean Customer's influent water or fluids to be provided by Customer at the inlet of the Equipment, and subject to treatment under the terms and conditions of this Agreement
Minimum Processing Charge	A minimum fee, per unit delivered, generally exclusive of Field Service Representative, service, and delivery and removal charges, that applies when the processing charge is expressed as a cost per 1,000 gallons or other unit of volume. The minimum covers mobilization and preparation of the unit and is charged only when gallons processed times the processing charge yield less than the stated minimum.
Mobilization Charges	Price charged for the supply of project specific equipment required for the operation of the water treatment plant.
Preparation Charge	A fee charged for labor and materials to prepare equipment to meet specific Customer requirements. May also be identified as a Set-up Charge.

Processing Charge	A fee charged for the processing of a fluid through equipment supplied by Veolia. This fee may be expressed as a cost per unit of volume, cost per unit delivered, or cost per day, week, or month.
Service Center	A location where Veolia provides services including resin regeneration, fleet storage, analytical services, sales support and technical support.
Service Charge	A fee imposed, usually hourly, daily or monthly, for the use of Veolia's fluid treatment equipment. Service Charges commence upon arrival at customer's site unless otherwise specified.
Services	shall mean the overall services to be provided by Veolia, as consisting of the deployment and provision of the Equipment and corresponding processing services relating to the treatment of Influent Water as further detailed in the Veolia Scope of Supply section
Site	shall mean Customers premises at Worcester County Department of Public Works Berlin, MD United States
Surcharge	A temporary fee charged to recover unusual increase in cost of production or distribution materials. The fee is based on a sliding scale index.
Unit/System/ Equipment	Generally referred to as a piece or array of fluid treatment equipment, which may be of either mobile or fixed-base design.
Waste Water	shall mean the waste generated from the Equipment to Customer's drain resulting from the treatment of influent water.

B.2 Field Service Representative Charges

Per Hour	When required or requested by the Customer, Veolia will bill the Customer for all hours worked by the Field Service Representative while on-site at the Customer's location. Unless otherwise specified, a minimum of eight (8) hours per 24-hour day will be charged while the Field Service Representative is engaged by the Customer, whether the Field Service Representative is required to report to the Customer's location, or remain in the local area on stand-by. A daily log sheet is provided by Veolia for the Customer's use in accounting for hours worked or charged for. The hourly rate is the same for straight time, overtime, holidays, or weekends.
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Appendix C. Conditions of Contract and Warranties

SELLER:

Veolia WTS Services USA, Inc.
4545 Patent Road
Norfolk, VA 23502
USA

BUYER:

Worcester County Department of Public Works
11401 Grays Corner Road, Riddle Farm Wastewater Treatment Plant
Berlin, MD 21811-2467
USA

As used in the Terms and Conditions, the term “Goods” shall mean materials as outlined in the Veolia Scope of Supply section of this proposal.

SUEZ Water Technologies & Solutions is now part of Veolia. This change will not impact your contract or the team supporting your business. We will be changing our legal entity name, but this will not change in any way the tax identification number, or our banking information. The detail of changes to the legal entity name will be communicated separately.

C.1 Attachment 1 - Terms and Conditions of Contract

The terms and conditions herein will be active and applicable until terminated in accordance with Article 11. Customer may place orders under these terms and conditions at any time during this applicability period. Pricing offered within shall be valid for 30 days. Veolia WTS SERVICES USA, INC., Inc, a Virginia, U.S. corporation ("Veolia WTS Services USA, Inc."), and ("Customer") agree:

1. Veolia WTS Services USA, Inc. SERVICES

When Customer has fully complied with Paragraph 2 below, Veolia WTS Services USA, Inc. shall:

- Provide the equipment as listed in the Commercial Offer (the "Equipment") or, at Veolia WTS Services USA, Inc.'s option, other equipment sufficient to meet Customer's requirements, on a priority availability and preferred pricing basis.
- Treat Customer's influent water or other fluids ("Influent Water") to the quality specified in the Influent Water Quality table.
- Use its best efforts, at all times, to provide the Equipment, but shall not be liable for any delays in doing so.
- Provide a standard Certificate of Insurance, listing general liability, automobile liability and worker's compensation coverage.

2. CUSTOMER'S RESPONSIBILITIES

As a condition precedent to Veolia WTS Services USA, Inc.'s providing the Service, Customer shall, without cost to Veolia WTS Services USA, Inc. throughout the Agreement term:

- a. Provide a location at Customer's facilities, suitable for proper operation of the Equipment.
- b. Provide piping, fire hoses, fittings, electricity and other specified equipment and services, as required.
- c. Provide Influent Water of the quality described in the Influent Water Quality table, at the pressure and at the flow rate required by Veolia WTS Services USA, Inc.
- d. Provide reasonable access to and security for the Equipment.
- e. Provide all necessary utilities to operate the Equipment.
- f. Provide all necessary licenses or permits required for the installation and operation of the Equipment required for the Service.

3. PRICE AND PAYMENT

The price and payment terms for Veolia WTS Services USA, Inc.'s Service are set forth in the Commercial Offer section. Any supplemental cost incurred by Veolia WTS Services USA, Inc. in the performance of any of Customer's responsibilities under Paragraph 3 of this Agreement shall be reimbursed. Payment shall be made in full in U.S. Dollars within thirty (30) days of the invoice date. If Customer disputes any portion of an invoice, it shall notify Veolia WTS Services USA, Inc. in writing with specificity and pay the undisputed portion within 30 days. In the event of an undisputed late payment, late payment charges will be added in accordance with state law. Customer may be held in default of this agreement if any invoiced amounts are undisputed and unpaid after 30 days beyond their original due date, and late payment charges will be applied. Purchaser agrees that Purchaser shall adjust the value and/or duration of the Purchase Order in a manner that adequately funds the Veolia WTS Services USA, Inc.'s continuous provision of all Purchaser authorized services.

Prices do not include sales, use, gross receipts, excise, value-added, services, penalty, addition to tax, interest, or assessment related thereto or any similar transaction or consumption taxes (collectively, "Taxes"). Veolia WTS Services USA, Inc. shall collect or seek reimbursement for any such Taxes imposed with respect to this Agreement, or services performed hereunder by Veolia WTS Services USA, Inc. or Veolia WTS Services USA, Inc.'s subcontractors, from Customer. Customer shall pay any such Taxes that may be levied on or assessed against Customer or Veolia WTS Services USA, Inc. and Veolia WTS Services USA, Inc.'s subcontractors and, if Veolia WTS Services USA, Inc. pays any such Taxes, reimburse Veolia WTS Services USA, Inc.. Each party shall be responsible for any personal property or real estate taxes on property that the party owns or leases, for franchise and privilege taxes on its business, and for taxes based on its net income or gross receipts. Customer shall furnish Veolia WTS Services USA, Inc. with evidence of tax exemption acceptable to taxing authorities if applicable.

Notwithstanding any existing agreement, Veolia reserves the right to increase billing amounts based on increases in the price of base components for the chemicals listed in this Quotation, where the increase in price of such base components is due to increased global demand, limited supply, temporary product shortages, allocation of supply, or other such similar inflationary pressures. Such price changes may be reversed as the inflationary pressures change. Upon request, Veolia will provide documentation in support of such price increases.

4. WATER QUALITY WARRANTY

Effluent Water quality shall meet or exceed the specifications in the Effluent Water Quality table. Any Effluent Water not meeting these specifications shall, at Veolia WTS Services USA, Inc.'s option, be replaced or reprocessed at no additional cost to Customer, unless the failure is caused by the acts or omissions of Customer, including but not limited to Customer's failure to provide the required Influent Water.

Veolia WTS Services USA, Inc. warrants only that the Equipment is capable of processing the Influent Water, described in the Influent Water Quality table to meet the specifications for Effluent Water in the Effluent Water Quality table. Veolia WTS Services USA, Inc. does not warrant the USE of the Effluent Water and, accordingly, such replacement or reprocessing shall be the Customer's sole and exclusive remedy. Veolia WTS Services USA, Inc. further warrants that Services will be performed in a good and workmanlike manner and will comply in all material respects with the requirements set forth in this Agreement. Customer shall notify Veolia WTS Services USA, Inc. of any warranty claim within thirty (30) days of the claimed item's delivery, and Customer's sole remedy shall be to have deficient services corrected or re-performed and to have defective products repaired or replaced.

Effluent Water processed for Customer is not intended, or suitable, for human consumption.

Veolia WTS SERVICES USA, INC. EXPRESSLY DISCLAIMS LIABILITY FOR INCIDENTAL AND/OR CONSEQUENTIAL DAMAGES INCLUDING, WITHOUT LIMITATION, LOST PROFITS RELATED TO BREACH OF WARRANTY, COSTS OF ACCESS TO THE EQUIPMENT FOR REPAIR/REPLACEMENT, AND DECONTAMINATION. EXCEPT AS EXPRESSLY SET FORTH IN THIS PARAGRAPH, Veolia WTS SERVICES USA, INC. MAKES NO WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, WARRANTIES OF MERCHANTABILITY OR OF FITNESS OF USE OR FOR THE PURPOSE INTENDED.

5. NO TITLE TO WATER

At no time shall Veolia WTS Services USA, Inc. be deemed to have taken title to Product Water, Feedwater, Nonstandard Substances ("Nonstandard Substances" shall mean substances or materials which are not specifically identified in the Influent Water Quality Window of in the Influent Water Quality table set forth herein or which were not or could not be reasonably anticipated by Veolia WTS Services USA, Inc. as being a component of the Influent Feedwater), Hazardous Materials ("Hazardous Materials" shall mean toxic substances, hazardous substances, pollutants, contaminants, regulated wastes, or hazardous wastes as such terms may be defined or classified in any statute or ordinance or regulations promulgated by any national, federal, state, provincial, or local governmental authority), or any other materials or substances processed at the site or treated by Veolia WTS Services USA, Inc. pursuant to this Agreement. Veolia WTS Services USA, Inc. does not take responsibility for or provide waste characterization, disposal facility selection, disposal, or payment of sewage or landfill fees. Customer is responsible for all wastes and waste disposal from the plant. Wastes may include, but are not limited to, water system reject waste, used RO membranes, filters, CIP related wastes and wastewaters, spent media, cartridge filters, equipment and consumables, lube/oil contaminated debris/rags, other maintenance related wastes, lab analysis residuals, and office waste. Customer is required to obtain Veolia WTS Services USA, Inc.'s written approval prior to any changes in reject disposal or use, or waste disposal methods or configuration being made.

6. LIMITATION OF LIABILITY

NOTWITHSTANDING ANYTHING ELSE IN THIS AGREEMENT, THE TOTAL LIABILITY OF Veolia WTS SERVICES USA, INC., its affiliates and subcontractors and their employees, officers, directors and agents, ON ALL CLAIMS OF ANY KIND ACCRUING DURING ANY CALENDAR YEAR, WHETHER IN CONTRACT (INCLUDING LIQUIDATED DAMAGES), WARRANTY, TORT (INCLUDING NEGLIGENCE), STRICT LIABILITY, OR OTHERWISE, ARISING OUT OF THE PERFORMANCE OR BREACH OF THIS AGREEMENT OR THE USE OF ANY PARTS OR THE PROVISION OF ANY SERVICES, SHALL NOT EXCEED FIFTY PERCENT OF THE AMOUNTS PAID BY CUSTOMER TO Veolia WTS SERVICES USA, INC. IN ANY CALENDAR YEAR, AND IN NO EVENT SHALL THE CUMULATIVE TOTAL LIABILITY OF Veolia WTS SERVICES USA, INC. ON ALL SUCH CLAIMS OF ANY KIND ARISING FROM OR RELATING TO THIS AGREEMENT, UNTIL THE TIME ALL SUCH LIABILITY ENDS, EXCEED AMOUNTS PAID BY CUSTOMER TO Veolia WTS SERVICES USA, INC. UNDER THIS AGREEMENT.

IN NO EVENT, WHETHER AS A RESULT OF BREACH OF CONTRACT, WARRANTY, INDEMNITY, TORT (INCLUDING NEGLIGENCE), STRICT LIABILITY, OR OTHERWISE, SHALL Veolia WTS SERVICES USA, INC. BE LIABLE FOR LOSS OF PROFIT OR REVENUES, LOSS OF USE OF THE SITE OR ANY ASSOCIATED EQUIPMENT OR SYSTEMS, COST OF CAPITAL, COST OF SUBSTITUTE EQUIPMENT, FACILITIES, SERVICES OR REPLACEMENT POWER, DOWNTIME COSTS, CLAIMS OF CUSTOMER'S CUSTOMERS FOR SUCH DAMAGES, OR FOR ANY SPECIAL, CONSEQUENTIAL, INCIDENTAL, INDIRECT, PUNITIVE OR EXEMPLARY DAMAGES.

IF Veolia WTS SERVICES USA, INC. FURNISHES CUSTOMER WITH ADVICE OR ASSISTANCE CONCERNING ANY PRODUCTS, SYSTEMS OR WORK WHICH IS NOT REQUIRED PURSUANT TO THIS AGREEMENT, THE FURNISHING OF SUCH ADVICE OR ASSISTANCE WILL NOT SUBJECT Veolia WTS SERVICES USA, INC. TO ANY LIABILITY, WHETHER IN CONTRACT, WARRANTY, INDEMNITY, TORT (INCLUDING NEGLIGENCE), STRICT LIABILITY OR OTHERWISE.

7. INSURANCE

Veolia WTS Services USA, Inc. shall provide and maintain in full force Commercial General Liability policy with a combined single limit of \$2,000,000 for bodily injury and property damage, with an excess liability policy of \$3,000,000 additional coverage. The Parties expressly agree that Veolia WTS Services USA, Inc. may self-insure any or all portions of the insurance mentioned in this or any portion of this Agreement.

Veolia WTS Services USA, Inc. (i) shall provide Customer, upon request, with certificates of insurance showing policy coverage and limits for policies required under this Section; (ii) shall not terminate the insurance coverage required under this Section without giving thirty (30) days prior written notice to Customer, and the policies shall provide for such written notice; and (iii) shall not materially modify the insurance coverage required under this Section without giving thirty (30) days prior written notice to Customer. Site-specific Certificates of Insurance are available upon request for a fixed annual administrative fee of \$126 per certificate.

Customer shall provide and maintain in full force Commercial General Liability insurance covering claims for personal injury, including bodily injury or death, and property damage arising from the performance of Veolia WTS Services USA, Inc.'s services hereunder to the extent such claims arise from the negligence or misconduct of Customer, with a \$2,000,000 minimum limit per occurrence for combined bodily injury and property damage and a \$5,000,000 minimum annual aggregate limit. Each policy shall name Veolia WTS Services USA, Inc. as additional insured and loss payee.

Customer (i) shall provide Veolia WTS Services USA, Inc., upon request with certificates of insurance showing policy coverage and limits for policies required under this Section; (ii) shall not terminate the insurance coverage required of Customer by this Section without giving thirty (30) days prior written notice to Veolia WTS Services USA, Inc. and the policies shall provide for such notice; and (iii) shall not materially modify the insurance coverage required of Customer by this Section without Customer giving thirty (30) days prior written notice to Veolia WTS Services USA, Inc..

8. INDEMNIFICATION

Veolia WTS Services USA, Inc. shall indemnify and hold harmless Customer from claims for physical damage to third party property or injury to persons, including death, to the extent caused by the negligence of Veolia WTS Services USA, Inc. or its officers, agents, employees, and/or assigns while engaged in activities under this Contract. Purchaser shall likewise indemnify and hold harmless Veolia WTS Services USA, Inc. from claims for physical damage to third party property or injury to persons, including death, to the extent caused by the negligence of the Customer, its officers, agents, employees, and/or assigns. In the event such damage or injury is caused by the joint or concurrent negligence of Veolia WTS Services USA, Inc. and Customer, the loss shall be borne by each Party in proportion to its negligence. "Third party" shall not include Customer. Customer shall also indemnify and hold harmless Veolia WTS Services USA, Inc. from claims due to Customer's violation of any Environmental, Health, or Safety Law (as subsequently defined); and from claims due to the release of any Hazardous Materials or Nonstandard Substance at, on, to, or from Customer property, unless such substance was brought on to Customer property by Veolia WTS Services USA, Inc. and Veolia WTS Services USA, Inc. caused the release of such substance;

Also, Customer acknowledges that purified water equipment may break and/or leak and that it should be installed only where there is adequate drainage and minimal risk of damage to other property. Veolia WTS Services USA, Inc. therefore shall not be liable to Customer or others for any damages, costs or expenses resulting from breaks in or leakage from equipment that Veolia WTS Services USA, Inc. owns, sells, rents, or services.

9. CONFIDENTIALITY

Any information disclosed by either party in connection with this Agreement and designated in writing, by label, stamp or other written communication by the disclosing party as “confidential” or “proprietary” at the time of disclosure shall be treated as “Confidential Information” subject to this Section. It is agreed that this Agreement and all drafts hereof, and all proposals, specifications, recommendations, instructions and all other similar documents, in all such forms as they may be delivered, shall be considered Veolia WTS Services USA, Inc.’s Confidential Information at all times. The recipient party agrees (i) to treat such Confidential Information as confidential and not disclose it to third parties other than Veolia WTS Services USA, Inc. Affiliate entities as necessary for performance of this Agreement, (ii) to restrict the use of such Confidential Information to matters relating to the recipient party’s performance of this Agreement, and (iii) to restrict access to such information to employees of the recipient party and Veolia WTS Services USA, Inc.’s Affiliate entities whose access is necessary in the implementation of this Agreement. All copies of written Confidential Information will be returned to the disclosing party upon request (i) except to the extent that an item of such information is designated to be retained by the recipient party pursuant to a specific provision of this Agreement, and (ii) Veolia WTS Services USA, Inc. may retain one copy of Customer Confidential Information until such time as all its liability under this Agreement terminates.

10. SCHEDULE - POSTPONEMENT OF PERFORMANCE

The consequences, direct or indirect, of acts of God, natural disasters, unusually severe weather, fire, terrorism, war (declared or undeclared) epidemics, material shortages, insurrection, act (or omissions) of Customer or Customer’s suppliers or agents, any act (or omission) by any governmental authority, strikes, labor disputes, transportation shortages, or failure of supply of raw materials and any causes beyond the reasonable control of the parties to this Agreement shall excuse performance to the extent performance has been prevented by such consequences. At the removal of the cause of interruption, performance shall be resumed fully in accordance with this Agreement.

In the event Veolia WTS Services USA, Inc. cannot provide the Service to meet the Customer’s requirements, Customer may utilize other sources to obtain Service until Veolia WTS Services USA, Inc. can meet its obligations under this Agreement. Veolia WTS Services USA, Inc. shall not be liable for any difference in the cost.

For emergency service requests for equipment and services, Veolia WTS Services USA, Inc. will respond within a time frame as notified by the Veolia WTS Services USA, Inc. Logistics Center at time of order. For non-emergency requests for service personnel, allow five business days notice to most efficiently schedule routine service call requests. Specific requests for expedited non-emergency service such as: ‘Same-day Service’, ‘Next-day Service’, or any off-schedule service visits requiring an on-site response in fewer than five days may be subject to an expediting charge of at least four (4) hours billed at overtime labor rates.

Veolia WTS Services USA, Inc.’s failure to provide the Service shall not result in termination of this Agreement. However, should Customer request the Service and Veolia WTS Services USA, Inc. not be able to provide the Service for a period in excess of 30 days, this Agreement will automatically terminate.

11. TERMINATION

Either party (the “Non-Defaulting Party”) may terminate this Agreement for default if the other Party (the “Defaulting Party”) (i) becomes Insolvent or (ii) the Defaulting Party commits a material breach of this Agreement and fails to cure the breach within ten days (10) days of notice from the Non-Defaulting Party, or fails to commence to cure the breach and diligently proceed with the cure if it is not possible to cure within ten (10) days of such notice. In addition to the foregoing, Veolia WTS Services USA, Inc. may terminate for default in the event of: (i) an event causing Veolia WTS Services USA, Inc. to suspend performance of the services which cannot reasonably be cured; (ii) Customer’s failure to perform any of its material obligations under this Agreement or any other agreement or order, which failure has a material and adverse effect on Veolia WTS Services USA, Inc.; (iii) laws or conditions or changes to such laws or conditions, which make performance by Veolia WTS Services USA, Inc. impossible or impractical or have a material effect on Veolia WTS Services USA, Inc. or performance by Veolia WTS Services USA, Inc. including but not limited to expropriation of all or any portion of the site; or (iv) facts or circumstances which arise, are discovered, or become known to Veolia WTS Services USA, Inc. which actually or potentially result in environmental, financial, labor or security risks that Veolia WTS Services USA, Inc. reasonably deems imprudent or unsuitable, and which were not fully disclosed, for whatever reason, by the Veolia WTS Services USA, Inc.’s reviews conducted to date. Veolia WTS Services USA, Inc. shall have the right to suspend performance upon written notice to Customer in any case where it would have the right to terminate the Agreement.

12. USE OF EQUIPMENT

Although the equipment will be utilized at the site, Customer acknowledges that Veolia WTS Services USA, Inc. shall retain beneficial ownership of the equipment and any other Veolia WTS Services USA, Inc. supplied parts, equipment, inventory, supplies and other assets utilized by Veolia WTS Services USA, Inc., or loaned or made available to Customer at the site. Veolia WTS Services USA, Inc. reserves the right to file a UCC-1 security form on all Veolia WTS Services USA, Inc.-owned equipment and products and a mechanic's lien on any labor performed by Veolia WTS Services USA, Inc. for the design, fabrication, installation, and maintenance of the system and hereby provides legal notice of its intention to do so if deemed necessary to ensure payment. Customer shall keep Veolia WTS Services USA, Inc.'s equipment free and clear of any liens. Upon expiration or termination of this Agreement Veolia WTS Services USA, Inc. shall have the right to disconnect and remove the equipment, parts or assets installed or utilized by Veolia WTS Services USA, Inc. pursuant to this Agreement.

Customer acknowledges that Veolia WTS Services USA, Inc.'s equipment is designed for specific applications and processes and therefore may not be relocated, modified, altered or changed in any way without the expressed, written consent of the Veolia WTS Services USA, Inc.. Customer is responsible for any loss or damage to Veolia WTS Services USA, Inc.'s equipment including but not limited to, theft, physical damage, operational impairment caused by lack of proper maintenance or operation outside manufacturer's or Veolia WTS Services USA, Inc.'s operating specifications, and deterioration or contamination from exposure to fumes or substances. Customer shall be solely responsible for any and all costs to test, decontaminate or dispose of and replace any of Veolia WTS Services USA, Inc.'s equipment or ion exchange resins contaminated by exposure to any process or application containing any Federal, DOT, or State listed hazardous waste or a characteristic hazardous waste. Upon request Customer shall certify to Veolia WTS Services USA, Inc., by means of a completed and signed Resin Process Profile form, the conditions under which all ion exchange resins will be operated.

Customer shall not remove the equipment from Customer's location designated in the Agreement and shall not sublease or lend the equipment or otherwise attempt to transfer or dispose of the equipment or any rights in or to the equipment. Before moving any equipment, Customer must notify and get Veolia WTS Services USA, Inc.'s permission, and in the event of any move, Customer assumes all responsibility for damages caused to equipment or any other property.

13. INTERPRETATION

The parties intend this Agreement, with any attached Exhibits and Addenda, as a final expression of their agreement and a complete and exclusive statement of its terms. No course of previous dealings between the parties and no usage of trade shall be relevant or admissible to supplement, explain or vary any of its terms. No representations, understandings or agreements have been made or relied on in making this Agreement other than those expressly set forth. This Agreement may be modified only by a writing signed by the parties or their duly authorized agents.

Veolia WTS Services USA, Inc. reserves the right to change these Terms and Conditions periodically and such changes shall be conveyed to the Customer in writing in conjunction with the annual Price Modifications. No other changes of these Terms and Conditions shall be of any force or effect unless reduced to writing and signed by duly authorized representatives of each party claimed to be bound thereby. These Terms and Conditions shall prevail over any inconsistent terms and conditions included in Customer's order, and no modification shall be effected by Veolia WTS Services USA, Inc.'s acknowledgement or acceptance of Customer's purchase order forms, which may contain different terms and conditions.

This Agreement shall be governed by and shall be construed according to the internal laws of the Commonwealth of Virginia, applicable to contracts made and to be performed wholly within the Commonwealth of Virginia. In the event of a dispute concerning this Agreement, the complaining party shall notify the other party in writing thereof. Management level representatives of both parties shall meet at an agreed location to attempt to resolve the dispute in good faith. Should the dispute not be resolved within thirty (30) days after such notice, the complaining party shall seek remedies exclusively through arbitration. The seat of arbitration shall be the federal district court in Philadelphia, PA, and the rules of the arbitration will be the Commercial Arbitration Rules of the American Arbitration Association, which are incorporated by reference into this clause.

Veolia WTS Services USA, Inc. and Purchaser will be deemed to have reasonably relied on any representations made or information furnished by the other, whether prior to or after the date of the Agreement. Neither the Agreement nor any proposals of Veolia WTS Services USA, Inc. nor any rights or obligations thereunder are assignable without Veolia WTS Services USA, Inc.'s written consent.

14. NOTICE

Notice of requirements for the Service shall be made by Customer calling Veolia WTS Services USA, Inc.'s 24 hour/7 day, toll-free number in Norfolk, Virginia (800) 446-8004 or by facsimile transmission to (757) 855-1478. All other notices required under this Agreement shall be sent by registered or certified mail, return receipt requested, postage paid, to the address shown below, or at such other address as either party shall designate in writing.

15. SEVERABILITY

If any provisions of this Agreement shall be held invalid, illegal or unenforceable, the validity, legality or enforceability of the remaining provisions shall in no way be affected or impaired.

16. SETOFF

Customer shall have no rights to any setoffs, abatements, suspensions, deferments, reductions, claims, counterclaims or defenses of any nature relating to any payments due under this Agreement.

17. PROPOSALS

Any proposals or price quotations rendered by Veolia WTS Services USA, Inc., may be modified or withdrawn by Veolia WTS Services USA, Inc. at any time prior to the bilateral execution of a written contract, and shall automatically expire in 30 days, except as otherwise expressly agreed in writing. Any offer made by Customer shall not be considered as accepted nor the terms thereof binding on Veolia WTS Services USA, Inc. until written confirmation of said offer has been sent by Veolia WTS Services USA, Inc.. Veolia WTS Services USA, Inc.'s obligation to provide Services shall be subject to approval of all orders by Veolia WTS Services USA, Inc.'s credit department, and Veolia WTS Services USA, Inc. may require full or partial payment in advance of performance. Any Services performed or items furnished by Veolia WTS Services USA, Inc. beyond those set forth in the Agreement will be charged at Veolia WTS Services USA, Inc.'s then standard rates.

18. NO NUCLEAR USE

Except as expressly permitted by this Agreement, the Buyer warrants that it shall not use or permit the use of the Equipment in connection with any nuclear installation or activity. Seller shall have no liability whatsoever for any nuclear or other damage, injury or contamination arising in connection with any such use.

SUEZ Water Technologies & Solutions is now part of Veolia. This change will not impact your contract or the team supporting your business. We will be changing our legal entity name, but this will not change in any way the tax identification number, or our banking information. The detail of changes to the legal entity name will be communicated separately.

Appendix D. Surcharge Tables

Fuel Surcharge Index											
The Fuel Price Index for each month will be determined by the U.S. price for diesel as reported by the U.S. Department of Energy (DOE) on the first Monday of each month. This price can be obtained by calling (202) 586-6966											
Fuel Price Index	Surcharge per Mile	Fuel Price Index (\$/gal)	Surcharge per Mile	Fuel Price Index	Surcharge per Mile	Fuel Price Index	Surcharge per Mile	Fuel Price Index	Surcharge per Mile	Fuel Price Index	Surcharge per Mile
\$2.84	\$2.89	\$ 0.29	\$3.50	\$3.55	\$ 0.40	\$4.16	\$4.21	\$ 0.51	\$4.82	\$4.87	\$ 0.62
\$2.90	\$2.95	\$ 0.30	\$3.56	\$3.61	\$ 0.41	\$4.22	\$4.27	\$ 0.52	\$4.88	\$4.93	\$ 0.63
\$2.96	\$3.01	\$ 0.31	\$3.62	\$3.67	\$ 0.42	\$4.28	\$4.33	\$ 0.53	\$4.94	\$4.99	\$ 0.64
\$3.02	\$3.07	\$ 0.32	\$3.68	\$3.73	\$ 0.43	\$4.34	\$4.39	\$ 0.54	\$5.00	\$5.05	\$ 0.65
\$3.08	\$3.13	\$ 0.33	\$3.74	\$3.79	\$ 0.44	\$4.40	\$4.45	\$ 0.55	\$5.06	\$5.11	\$ 0.66
\$3.14	\$3.19	\$ 0.34	\$3.80	\$3.85	\$ 0.45	\$4.46	\$4.51	\$ 0.56	\$5.12	\$5.17	\$ 0.67
\$3.20	\$3.25	\$ 0.35	\$3.86	\$3.91	\$ 0.46	\$4.52	\$4.57	\$ 0.57	\$5.18	\$5.23	\$ 0.68
\$3.26	\$3.31	\$ 0.36	\$3.92	\$3.97	\$ 0.47	\$4.58	\$4.63	\$ 0.58	\$5.24	\$5.29	\$ 0.69
\$3.32	\$3.37	\$ 0.37	\$3.98	\$4.03	\$ 0.48	\$4.64	\$4.69	\$ 0.59	\$5.30	\$5.35	\$ 0.70
\$3.38	\$3.43	\$ 0.38	\$4.04	\$4.09	\$ 0.49	\$4.70	\$4.75	\$ 0.60	\$5.36	\$5.41	\$ 0.71
\$3.44	\$3.49	\$ 0.39	\$4.10	\$4.15	\$ 0.50	\$4.76	\$4.81	\$ 0.61	\$5.42	\$5.47	\$ 0.72
For diesel fuel prices exceeding those in the table, each increase of \$0.05 in the cost of diesel fuel will create an increase of \$0.01 in the fuel surcharge.											
Rev 8/29/2018											

Appendix E. Field Service Support

E.1 Customer Operated Jobs*

When contracting for a Veolia water treatment system without the services of a Veolia Field Service Representative (FSR), the customer will be responsible to verify several parameters upon delivery of the equipment, including but not limited to:

- The equipment is secure and in good working order
- The shutdown features and alarms are activated and functioning
- Operating parameters are within the specific limits
- And the effluent water quality meets the required specifications

After verification of the above parameters and commencement of operation, water quantity and quality issues are the customer's responsibility.

Veolia services include:

- Guaranteed effluent water quality upon equipment delivery
- 24/365 technical assistance from Veolia's Logistics and Customer Service departments
- Emergency back-up equipment
- Emergency replacement parts
- Written equipment start-up and operational procedures
- Training for the operators

Customer responsibilities include:

- Daily operating labor
- Effluent water quality and quantity monitoring
- FSR transportation, labor, and per diem for all service calls
- Daily equipment readings
- Transmission of equipment readings to Veolia's Logistics department
- Routine maintenance and repair labor
- Replacement media, resin, and membranes (unless due to manufacturing defects)
- Instrument calibration
- Daily housekeeping
- Maintain influent water within the specified parameters
- Site access and security
- Site suitable for water treatment equipment
- Emergency first aid

Optional services available: Services of a Veolia FSR, trained in water treatment theory and operation by Veolia, are available at the request of the customer to:

- Provide equipment installation assistance and start-up services
- Operate and monitor equipment performance to guarantee effluent water quality and quantity
- Manage water inventory
- Provide repair services and troubleshoot problems

To increase FSR coverage, schedule service, order equipment, or request technical or field assistance, contact Veolia: In the US: (757) 855-9000 or US toll-free (800) 446-8004. Daily readings can be faxed to Veolia's Logistics department: In the US: (757) 855-1478.

* Customer operated applies when the customer has not contracted for scheduled FSR site visits.

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DIVISION 00 – BIDDING AND CONTRACT REQUIREMENTS

SECTION 00410 – BID FORM FOR CONSTRUCTION CONTRACT

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

ARTICLE 1—OWNER AND BIDDER

1.01 This Bid is submitted to:

**WORCESTER COUNTY, MARYLAND
ATTN: NICHOLAS RICE, PROCUREMENT OFFICER
1 WEST MARKET STREET, ROOM 103
SNOW HILL, MARYLAND 21863**

1.02 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with Owner in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

ARTICLE 2—ATTACHMENTS TO THIS BID

2.01 The following documents are submitted with and made a condition of this Bid:

- A. Required Bid security;
- B. List of Proposed Subcontractors;
- C. List of Proposed Suppliers;
- D. Evidence of authority to do business in the state of the Project; or a written covenant to obtain such authority within the time for acceptance of Bids;
- E. Contractor's license number as evidence of Bidder's State Contractor's License or a covenant by Bidder to obtain said license within the time for acceptance of Bids; failure to do so may result in rejection of Bid;
- F. Required Bidder Qualification Statement with supporting data;
- G. If Bid amount exceeds \$10,000, signed Compliance Statement (RD 400-6). Refer to specific equal opportunity requirements set forth in the Supplementary Conditions of the Construction Contract (EJCDC C-800);
- H. If Bid amount exceeds \$25,000, signed Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion - Lower Tier Covered Transactions (AD-1048);
- I. If Bid amount exceeds \$100,000, signed RD Instruction 1940-Q Exhibit A-1, Certification for Contracts, Grants, and Loans.

ARTICLE 3—BASIS OF BID

- 3.01 Bidder will complete the Work in accordance with the Contract Documents for the following price(s):
- A. Bidder will complete the Work in accordance with the Contract Documents for the following lump sum (stipulated) price(s):

SCHEDULE A –LUMP SUM PRICES BID

ITEM NO.	DESCRIPTION	UNIT	EST QTY	BID PRICE
A1	Mobilization/General Conditions (not exceeding 5% of Item No. A3)	Lump Sum	1	\$
A2	Demolition and Disposal of existing structures, equipment, buildings, and all appurtenances.	Lump Sum	1	\$
A3	Treatment Plant and all appurtenances not included within Bid Item B4 and C1.	Lump Sum	1	\$
Subtotal Schedule A				\$

- B. Bidder will complete the Work under Schedule B, when authorized, in accordance with the Contract Documents for the following price(s):

SCHEDULE B – UNIT PRICE CONTINGENT BID ITEMS

ITEM NO.	DESCRIPTION	SIZE	UNIT	EST QTY	BID UNIT PRICE	ESTIMATED BID PRICE
B1	Furnish and Place Miscellaneous 3,000 Concrete	--	CY	10	\$	\$
B2	Furnish and Place Gravel Bedding	--	CY	10	\$	\$
B3	Furnish and Place Special Backfill	--	CY	10	\$	\$
B4	Temporary Membrane Filtration System	100,000 gpd	Month	6	\$ 43,500.00	\$ 261,000.00
Subtotal Schedule B						\$

- 3.02 Bidder acknowledges that (1) each Bid Unit Price includes an amount considered by Bidder to be adequate to cover Contractor’s overhead and profit for each separately identified item, and (2) estimated quantities are not guaranteed, and are solely for the purpose of comparison of Bids, and final payment for all unit price Bid items will be based on actual quantities, determined as provided in the Contract Documents.

Item C1, (MBR) Membranes: This item includes a stipulated price for furnishing all equipment and manufacturer’s services assigned to Contractor. This price is based upon the procurement purchase order 160-22120 between the OWNER and Zenon Environmental Corporation dated July 6, 2023. Note that this stipulated price is subject to change following Award of the Contract and execution of the Agreement between OWNER and Bidder.

SCHEDULE C: EQUIPMENT AND SERVICES ASSIGNMENT

ITEM NO.	DESCRIPTION	STIPULATED PRICE
C1	ZW500D Replacement Cassettes & associated hardware & services.	\$312,050.00

Item D. **ADD ALTERNATE: WASTE BACKWASH SETTLING TANK AND PUMP STATION:** This item includes a lump sum price for furnishing all construction, equipment, appurtenances, and services associated with the waste backwash settling tank and pump station as indicated on the drawings.

SCHEDULE D: ADD ALTERNATE

ITEM NO.	DESCRIPTION	ADD ALTERNATE PRICE
D1	Waste Backwash Settling Tank and Pump Station and Appurtenances	

3.03 *Total Bid Price*

Total Bid Price: Total of Schedule A + B + C+ D	\$
--	----

_____ Dollars \$(_____)

ARTICLE 4—TIME OF COMPLETION

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

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

5.01 *Bid Acceptance Period*

- A. This Bid will remain subject to acceptance for 100 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

5.02 *Instructions to Bidders*

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

5.03 *Receipt of Addenda*

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

Addendum Number	Addendum Date

5.04 *Assignment of Procurement Contract*

- A. Bidder acknowledges the provisions of the Agreement as to the assignment of the procurement contract for ZW500D LEAPmbr SUPPLY AND SERVICES of goods and special services for Membrane Bio-Reactor.

ARTICLE 6—BIDDER’S REPRESENTATIONS AND CERTIFICATIONS

6.01 *Bidder’s Representations*

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

Supplementary Conditions or by definition, with respect to the effect of such information, observations, and Technical Data on (a) the cost, progress, and performance of the Work; (b) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, if selected as Contractor; and (c) Bidder's (Contractor's) safety precautions and programs.

7. Based on the information and observations referred to in the preceding paragraph, Bidder agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract.
8. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.
9. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and of discrepancies between Site conditions and the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.
10. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.
11. The submission of this Bid constitutes an incontrovertible representation by Bidder that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

6.02 *Bidder's Certifications*

A. The Bidder certifies the following:

1. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation.
2. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid.
3. Bidder has not solicited or induced any individual or entity to refrain from bidding.
4. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 8.02.A:
 - a. Corrupt practice means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process.
 - b. Fraudulent practice means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition.
 - c. Collusive practice means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels.
 - d. Coercive practice means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

5. There has been no violation of copyrights or patent rights in manufacturing, producing, or selling the product or services shipped or ordered as a result of this Bid. The successful Bidder shall, at his own expense, defend any and all actions or suits charging such infringements, and will save Worcester County, and its appointed and elected officials, officers, partners, directors, employees, and agents harmless from any and all liability, loss, or expense occasioned by any such violation.

BIDDER hereby submits this Bid as set forth above:

Bidder:

(typed or printed name of organization)

By: _____
(individual's signature)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Date: _____
(typed or printed)

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

Attest: _____
(individual's signature)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Date: _____
(typed or printed)

Address for giving notices:

Bidder's Contact:

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Phone: _____

Email: _____

Address: _____

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

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DIVISION 00 – BIDDING AND CONTRACT REQUIREMENTS

SECTION 00430

BID BOND (PENAL SUM FORM)

<p>Bidder Name: [Full formal name of Bidder] Address <i>(principal place of business)</i>: [Address of Bidder’s principal place of business]</p>	<p>Surety Name: [Full formal name of Surety] Address <i>(principal place of business)</i>: [Address of Surety’s principal place of business]</p>
<p>Owner Name: Worcester County Address <i>(principal place of business)</i>: 1 West Street, Room 103 Snow Hill, MD 21863</p>	<p>Bid Project <i>(name and location)</i>: Riddle Farm WWTP Equipment Upgrades Berlin, Maryland Bid Due Date: [Enter date bid is due]</p>
<p>Bond Penal Sum: [Amount] Date of Bond: [Date]</p>	
<p>Surety and Bidder, intending to be legally bound hereby, subject to the terms set forth in this Bid Bond, do each cause this Bid Bond to be duly executed by an authorized officer, agent, or representative.</p>	
<p>Bidder</p>	<p>Surety</p>
<p align="center"><i>(Full formal name of Bidder)</i></p>	<p align="center"><i>(Full formal name of Surety) (corporate seal)</i></p>
<p>By: _____ <i>(Signature)</i></p>	<p>By: _____ <i>(Signature) (Attach Power of Attorney)</i></p>
<p>Name: _____ <i>(Printed or typed)</i></p>	<p>Name: _____ <i>(Printed or typed)</i></p>
<p>Title: _____</p>	<p>Title: _____</p>
<p>Attest: _____ <i>(Signature)</i></p>	<p>Attest: _____ <i>(Signature)</i></p>
<p>Name: _____ <i>(Printed or typed)</i></p>	<p>Name: _____ <i>(Printed or typed)</i></p>
<p>Title: _____</p>	<p>Title: _____</p>
<p><i>Notes: (1) Note: Addresses are to be used for giving any required notice. (2) Provide execution by any additional parties, such as joint venturers, if necessary.</i></p>	

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

DIVISION 00 – BIDDING AND CONTRACT REQUIREMENTS

SECTION 00451 - QUALIFICATIONS STATEMENT

ARTICLE 1—GENERAL INFORMATION

1.01 Provide contact information for the Business:

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

1.02 Provide information on the Business’s organizational structure:

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

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

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

Address:			
Name of business:		Affiliation:	
Address:			

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

Name:		Title:		
Authorized to sign contracts:	<input type="checkbox"/> Yes <input type="checkbox"/> No	Limit of Authority:	\$	
Name:		Title:		
Authorized to sign contracts:	<input type="checkbox"/> Yes <input type="checkbox"/> No	Limit of Authority:	\$	
Name:		Title:		
Authorized to sign contracts:	<input type="checkbox"/> Yes <input type="checkbox"/> No	Limit of Authority:	\$	
Name:		Title:		

ARTICLE 2—LICENSING

2.01 Provide information regarding licensure for Business:

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

ARTICLE 3—DIVERSE BUSINESS CERTIFICATIONS

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

Certification	Certifying Agency	Certification Date
<input type="checkbox"/> Disadvantaged Business Enterprise		
<input type="checkbox"/> Minority Business Enterprise		
<input type="checkbox"/> Woman-Owned Business Enterprise		
<input type="checkbox"/> Small Business Enterprise		
<input type="checkbox"/> Disabled Business Enterprise		
<input type="checkbox"/> Veteran-Owned Business Enterprise		
<input type="checkbox"/> Service-Disabled Veteran-Owned Business		
<input type="checkbox"/> HUBZone Business (Historically Underutilized) Business		

<input type="checkbox"/> Other			
<input type="checkbox"/> None			

ARTICLE 4—SAFETY

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

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

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

Year									
Company	EMR	TRFR	MH	EMR	TRFR	MH	EMR	TRFR	MH

ARTICLE 5—FINANCIAL

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

Financial Institution:		
Business address:		
Date of Business’s most recent financial statement:		<input type="checkbox"/> Attached
Date of Business’s most recent audited financial statement:		<input type="checkbox"/> Attached
Financial indicators from the most recent financial statement		
Contractor’s Current Ratio (Current Assets ÷ Current Liabilities)		
Contractor’s Quick Ratio ((Cash and Cash Equivalents + Accounts Receivable + Short Term Investments) ÷ Current Liabilities)		

ARTICLE 6—SURETY INFORMATION

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

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

ARTICLE 7—INSURANCE

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

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

ARTICLE 8—CONSTRUCTION EXPERIENCE

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

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

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

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

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

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

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

ARTICLE 9—REQUIRED ATTACHMENTS

9.01 Provide the following information with the Statement of Qualifications:

- A. If Business is a Joint Venture, separate Qualifications Statements for each Joint Venturer, as required in Paragraph 1.02.
- B. Diverse Business Certifications if required by Paragraph 3.01.
- C. Certification of Business’s safety performance if required by Paragraph 4.02.
- D. Financial statements as required by Paragraph 5.01.
- E. Attachments providing additional information as required by Paragraph 8.02.

- F. Schedule A (Current Projects) as required by Paragraph 8.03.
- G. Schedule B (Previous Experience with Similar Projects) as required by Paragraph 8.04.
- H. Schedule C (Key Individuals) and resumes for the key individuals listed, as required by Paragraph 8.05.
- I. Additional items as pertinent.

This Statement of Qualifications is offered by:

Business: _____
(typed or printed name of organization)

By: _____
(individual's signature)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Date: _____
(date signed)

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

Attest: _____
(individual's signature)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Address for giving notices:

Designated Representative:

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Address: _____

Phone: _____

Email: _____

Schedule A—Current Projects

Name of Organization					
Project Owner			Project Name		
General Description of Project					
Project Cost			Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Project Owner			Project Name		
General Description of Project					
Project Cost			Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Project Owner			Project Name		
General Description of Project					
Project Cost			Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Schedule B—Previous Experience with Similar Projects

Name of Organization					
Project Owner			Project Name		
General Description of Project					
Project Cost			Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Project Owner			Project Name		
General Description of Project					
Project Cost			Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Project Owner			Project Name		
General Description of Project					
Project Cost			Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Schedule B—Previous Experience with Similar Projects

Name of Organization					
Project Owner			Project Name		
General Description of Project					
Project Cost			Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Project Owner			Project Name		
General Description of Project					
Project Cost			Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Project Owner			Project Name		
General Description of Project					
Project Cost			Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Schedule C—Key Individuals

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

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

DIVISION 00 – BIDDING AND CONTRACT REQUIREMENTS

SECTION 00510 - NOTICE OF AWARD

Date of Issuance:

Owner: **Worcester County**

Owner’s Project No.:

Engineer: **George, Miles & Buhr, LLC**

Engineer’s Project No.: **220047**

Project: **Riddle Farm WWTP Equipment Upgrades**

Contract Name: **Riddle Farm WWTP Equipment Upgrades**

Bidder:

Bidder’s Address:

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

[Describe Work, alternates, or sections of Work awarded]

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

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

Drawings will be delivered separately from the other Contract Documents.

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

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

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

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

Owner: **[Full formal name of Owner]**

By *(signature)*: _____

Name *(printed)*: _____

Title: _____

Copy: Engineer

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DIVISION 00 – BIDDING AND CONTRACT REQUIREMENTS
SECTION 00520 - AGREEMENT BETWEEN OWNER AND CONTRACTOR
FOR CONSTRUCTION CONTRACT (STIPULATED PRICE)

This Agreement is by and between **Worcester County**, (“Owner”) and _____
_____ (“Contractor”).

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

Owner and Contractor hereby agree as follows:

ARTICLE 1—WORK

1.01 Work consists of furnishing and installing equipment upgrades for replacing the (1) MBR membranes and associated controls; (2) installing new internal recycle pumps; (3) new blower for the membrane cleaning tank; (4) replacement of an existing hoist and crane assembly as well as installation of a new mono-rail beam and hoist assembly; (5) backwash water pump station and reclaimed water settling tank for the Riddle Farm Water Treatment Plant; (6) variable speed drives for the Process Blowers; (7) associated piping, valves, flow meters and all associated appurtenances. The MBR replacement membranes and associated equipment was secured by the OWNER through an MDE approved competitive procurement and will be furnished by VEOLIA - ZENON under a fixed-price contract applicable to all BIDDERS.

ARTICLE 2—THE PROJECT

2.01 The Project, of which the Work under the Contract Documents is a part, is generally described as follows: **Riddle Farm WWTP Equipment Upgrades.**

ARTICLE 3—ENGINEER

3.01 The Owner has retained **George, Miles and Buhr, LLC** (“Engineer”) to act as Owner’s representative, assume all duties and responsibilities of Engineer, and have the rights and authority assigned to Engineer in the Contract.

3.02 The part of the Project that pertains to the Work has been designed by **George, Miles & Buhr, LLC.**

ARTICLE 4—CONTRACT TIMES

4.01 *Time is of the Essence*

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

4.03 *Contract Times: Days*

A. The Work will be substantially complete within 360 days after the date when the Contract Times commence to run as provided in Paragraph 4.01 of the General Conditions, and completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions within 420 days after the date when the Contract Times commence to run.

4.05 *Liquidated Damages*

- A. Contractor and Owner recognize that time is of the essence as stated in Paragraph 4.01 above and that Owner will suffer financial and other losses if the Work is not completed and Milestones not achieved within the Contract Times, as duly modified. The parties also recognize the delays, expense, and difficulties involved in proving, in a legal or arbitration proceeding, the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty):
1. *Substantial Completion:* Contractor shall pay Owner **\$2,000** for each day that expires after the time (as duly adjusted pursuant to the Contract) specified above for Substantial Completion, until the Work is substantially complete.
 2. *Completion of Remaining Work:* After Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Times (as duly adjusted pursuant to the Contract) for completion and readiness for final payment, Contractor shall pay Owner **\$1,000** for each day that expires after such time until the Work is completed and ready for final payment.
 4. Liquidated damages for failing to timely attain Milestones, Substantial Completion, and final completion are not additive, and will not be imposed concurrently.
- B. If Owner recovers liquidated damages for a delay in completion by Contractor, then such liquidated damages are Owner's sole and exclusive remedy for such delay, and Owner is precluded from recovering any other damages, whether actual, direct, excess, or consequential, for such delay, except for special damages (if any) specified in this Agreement.
- C. **Deleted.**

4.06 *Special Damages*

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

ARTICLE 5—CONTRACT PRICE

- 5.01 Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents, the amounts that follow, subject to adjustment under the Contract:
- A. For all Work, at the prices stated in Contractor's Bid, attached hereto as an exhibit.

ARTICLE 6—PAYMENT PROCEDURES

6.01 *Submittal and Processing of Payments*

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

6.02 *Progress Payments; Retainage*

- A. Owner shall make progress payments on the basis of Contractor's Applications for Payment no more than once monthly during performance of the Work as provided in Paragraph 6.02.A.1 below, provided that such Applications for Payment have been submitted in a timely manner and otherwise meet the requirements of the Contract. All such payments will be measured by the Schedule of Values established as provided in the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no Schedule of Values, as provided elsewhere in the Contract.
 - 1. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as Owner may withhold, including but not limited to liquidated damages, in accordance with the Contract.
 - a. **95** percent of the value of the Work completed (with the balance being retainage).
 - b. **95** percent of cost of materials and equipment not incorporated in the Work (with the balance being retainage).
- B. Upon Substantial Completion **of the entire construction to be provided under the construction Contract Documents**, Owner shall pay an amount sufficient to increase total payments to Contractor to **100** percent of the Work completed, less such amounts set off by Owner pursuant to Paragraph 15.01.E of the General Conditions, and less **200** percent of Engineer's estimate of the value of Work to be completed or corrected as shown on the punch list of items to be completed or corrected prior to final payment.

6.03 *Final Payment*

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

6.04 *Consent of Surety*

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

ARTICLE 7—CONTRACT DOCUMENTS

7.01 *Contents*

- A. The Contract Documents consist of all of the following:
 - 1. This Agreement.
 - 2. Bonds:
 - a. Performance bond (together with power of attorney).
 - b. Payment bond (together with power of attorney).

3. General Conditions.
 4. Supplementary Conditions.
 5. Specifications as listed in the table of contents of the Project Manual (~~copy of list attached~~).
 6. Drawings (not attached but incorporated by reference) consisting of **28** sheets with each sheet bearing the following general title: **Riddle Farm Wastewater Treatment Plant, Equipment Upgrades.**
 - ~~7. Drawings listed on the attached sheet index.~~
 8. Addenda (numbers **[number]** to **[number]**, inclusive).
 9. Exhibits to this Agreement (enumerated as follows):
 - a. Contractor's Bid (Pages ___ to ___, inclusive).
 10. The following which may be delivered or issued on or after the Effective Date of the Contract and are not attached hereto:
 - a. Notice to Proceed.
 - b. Work Change Directives.
 - c. Change Orders.
 - d. Field Orders.
 - e. Warranty Bond, if any.
- B. The Contract Documents listed in Paragraph 7.01.A are attached to this Agreement (except as expressly noted otherwise above).
- C. There are no Contract Documents other than those listed above in this Article 7.
- D. The Contract Documents may only be amended, modified, or supplemented as provided in the Contract.

ARTICLE 8—REPRESENTATIONS, CERTIFICATIONS, AND STIPULATIONS

8.01 Contractor's Representations

- A. In order to induce Owner to enter into this Contract, Contractor makes the following representations:
1. Contractor has examined and carefully studied the Contract Documents, including Addenda.
 2. Contractor has visited the Site, conducted a thorough visual examination of the Site and adjacent areas, and become familiar with the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
 3. Contractor is familiar with all Laws and Regulations that may affect cost, progress, and performance of the Work.
 4. Contractor has carefully studied the reports of explorations and tests of subsurface conditions at or adjacent to the Site and the drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, with respect to the Technical Data in such reports and drawings.

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

8.02 *Contractor's Certifications*

- A. Contractor certifies that it has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for or in executing the Contract. For the purposes of this Paragraph 8.02:
 1. "corrupt practice" means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process or in the Contract execution;
 2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process or the execution of the Contract to the detriment of Owner, (b) to establish Bid or Contract prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;
 3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish Bid prices at artificial, non-competitive levels; and

4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

8.03 *Standard General Conditions*

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

ARTICLE 9—MISCELLANEOUS

9.01 **ASSIGNMENT OF CONTRACT**

- A. The contract between Owner as "buyer" and Veolia - Zenon as "seller" for procurement of goods and special services ("procurement contract") for Membranes and Control Services is hereby assigned to Contractor by Owner, and Contractor accepts such assignment. A form documenting the assignment is attached as an Exhibit A to this Agreement.
- B. This assignment will occur on the Effective Date of the Agreement, and will relieve the Owner as "buyer" from all further obligations and liabilities under the procurement contract. Contractor will assume full responsibility for the performance of "seller" as a Subcontractor, with the exclusion of "design support services" and "annual support". Notwithstanding this assignment, all performance guarantees and warranties required by the "procurement contract" will continue to run for the benefit of the Owner and, in addition, for the benefit of the Contractor. Except as noted in the agreement between "buyer" and "seller", all rights, duties and obligations of Engineer to "buyer" and "seller" under the "procurement contract" will cease.
- C. Owner will provide Contractor with a conformed copy of the assigned contract after the assignment is completed.

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

This Agreement will be effective on _____ (which is the Effective Date of the Contract).

Owner:
 Worcester County

(typed or printed name of organization)

Contractor:

(typed or printed name of organization)

By: _____
(individual's signature)

By: _____
(individual's signature)

Date: _____
(date signed)

Date: _____
(date signed)

Name: _____

Name: _____
(typed or printed)

Title: _____

Title: _____

(typed or printed)

Attest: _____
(individual's signature)

Title: _____
(typed or printed)

Address for giving notices:
1 West Street
Snow Hill, MD 21863

Designated Representative:

Name: Dalla Baker, P.E.
(typed or printed)

Title: Director of Public Works
(typed or printed)

Address:
6113 Timmons Road
Snow Hill, MD 21863

Phone: 410-632-5623

Email: dbaker@co.worcester.md.us
(If [Type of Entity] is a corporation, attach evidence of authority to sign. If [Type of Entity] is a public body, attach evidence of authority to sign and resolution or other documents authorizing execution of this Agreement.)

(typed or printed)

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

Attest: _____
(individual's signature)

Title: _____
(typed or printed)

Address for giving notices:

Designated Representative:

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Address:

Phone: _____

Email: _____

License No.: _____
(where applicable)

State: _____

ATTACHMENT A
ASSIGNMENT

This assignment will be effective on the date of its execution. The Contract between Worcester County (“OWNER” or “BUYER”) and VEOLIA – ZENON (“VENDOR” or “SELLER”) for furnishing the membranes and control upgrade servicers under the Contract Documents entitled: RIDDLE FARM WWTP EQUIPMENT UPGRADES, is hereby assigned, transferred, and set over to _____ (“INSTALLING CONTRACTOR”).

The INSTALLING CONTRACTOR shall be responsible for the obligations under the Equipment Supply Contract and related attachments, including but not limited to the scope of supplies and services attributable to VENDOR in the Seller’s Proposal 496439-2, 11/28/2022, and for the duties, rights and obligations of the OWNER not otherwise retained by the Owner, under the terms of the Contract between OWNER and VENDOR.

The parties have executed this Assignment by their authorized representative on this _____ day of _____, 2024.

WORCESTER COUNTY

By: _____
(Signature)

(Title)

ASSIGNMENT: ACKNOWLEDGE AND ACCEPTED BY:

MEMBRANE VENDOR: **VEOLIA - ZENON**

By: _____
(Signature)

(Title)

ASSIGNMENT ACCEPTED BY:

INSTALLING CONTRACTOR

By: _____
(Signature)

(Title)

DIVISION 00 – BIDDING AND CONTRACT REQUIREMENTS

SECTION 00550 - NOTICE TO PROCEED

Owner: Worcester County Owner's Project No.: _____
Engineer: George, Miles & Buhr, LLC Engineer's Project No.: 220047
Contractor: _____ Contractor's Project No.: _____
Project: Riddle Farm WWTP Equipment Upgrades
Contract Name: Riddle Farm WWTP Equipment Upgrades
Effective Date of Contract: _____

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

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

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

The date by which Substantial Completion must be achieved is **[date for Substantial Completion, from Agreement]**, and the date by which readiness for final payment must be achieved is **[date for readiness, from Agreement]**.

[or]

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

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

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

Owner: [Full formal name of Owner]
By (signature): _____
Name (printed): _____
Title: _____
Date Issued: _____
Copy: Engineer

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DIVISION 00 – BIDDING AND CONTRACT REQUIREMENTS

SECTION 00610 - PERFORMANCE BOND

<p>Contractor Name: [Full formal name of Contractor] Address <i>(principal place of business):</i> [Address of Contractor’s principal place of business]</p>	<p>Surety Name: [Full formal name of Surety] Address <i>(principal place of business):</i> [Address of Surety’s principal place of business]</p>
<p>Owner Name: Worcester County Mailing address <i>(principal place of business):</i> 1 West Street Snow Hill, MD 21863</p>	<p>Contract Description <i>(name and location):</i> Riddle Farm WWTP Equipment Upgrades Berlin, Maryland Contract Price: [Amount from Contract] Effective Date of Contract: [Date from Contract]</p>
<p>Bond Bond Amount: [Amount] Date of Bond: [Date] <i>(Date of Bond cannot be earlier than Effective Date of Contract)</i> Modifications to this Bond form: <input type="checkbox"/> None <input type="checkbox"/> See Paragraph 16</p>	
<p>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.</p>	
<p>Contractor as Principal</p>	<p>Surety</p>
<p><i>(Full formal name of Contractor)</i></p>	<p><i>(Full formal name of Surety) (corporate seal)</i></p>
<p>By: _____ <i>(Signature)</i></p>	<p>By: _____ <i>(Signature)(Attach Power of Attorney)</i></p>
<p>Name: _____ <i>(Printed or typed)</i></p>	<p>Name: _____ <i>(Printed or typed)</i></p>
<p>Title: _____</p>	<p>Title: _____</p>
<p>Attest: _____ <i>(Signature)</i></p>	<p>Attest: _____ <i>(Signature)</i></p>
<p>Name: _____ <i>(Printed or typed)</i></p>	<p>Name: _____ <i>(Printed or typed)</i></p>
<p>Title: _____</p>	<p>Title: _____</p>
<p><i>Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party is considered plural where applicable.</i></p>	

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner for the performance of the Construction Contract, 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: **[Describe modification or enter “None”]**

DIVISION 00 – BIDDING AND CONTRACT REQUIREMENTS

SECTION 00615 - PAYMENT BOND

<p>Contractor Name: [Full formal name of Contractor] Address <i>(principal place of business)</i>: [Address of Contractor’s principal place of business]</p>	<p>Surety Name: [Full formal name of Surety] Address <i>(principal place of business)</i>: [Address of Surety’s principal place of business]</p>
<p>Owner Name: Worcester County Mailing address <i>(principal place of business)</i>: 1 West Street Snow Hill, MD 21863</p>	<p>Contract Description <i>(name and location)</i>: Riddle Farm WWTP Equipment Upgrades Berlin, Maryland Contract Price: [Amount, from Contract] Effective Date of Contract: [Date, from Contract]</p>
<p>Bond Bond Amount: [Amount] Date of Bond: [Date] <i>(Date of Bond cannot be earlier than Effective Date of Contract)</i> Modifications to this Bond form: <input type="checkbox"/> None <input type="checkbox"/> See Paragraph 18</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: **[Describe modification or enter “None”]**

Contractor's Application for Payment

Owner: <u>Worcester County</u>	Owner's Project No.: _____
Engineer: <u>George, Miles & Buhr, LLC</u>	Engineer's Project No.: <u>220047</u>
Contractor: _____	Contractor's Project No.: _____
Project: <u>Riddle Farm WWTP Equipment Upgrades</u>	
Contract: <u>Riddle Farm WWTP Equipment Upgrades</u>	
Application No.: _____	Application Date: _____
Application Period: From _____ to _____	

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

Contractor's Certification

The undersigned Contractor certifies, to the best of its knowledge, the following:

(1) All previous progress payments received from Owner on account of Work done under the Contract have been applied on account to discharge Contractor's legitimate obligations incurred in connection with the Work covered by prior Applications for Payment;

(2) Title to all Work, materials and equipment incorporated in said Work, or otherwise listed in or covered by this Application for Payment, will pass to Owner at time of payment free and clear of all liens, security interests, and encumbrances (except such as are covered by a bond acceptable to Owner indemnifying Owner against any such liens, security interest, or encumbrances); and

(3) All the Work covered by this Application for Payment is in accordance with the Contract Documents and is not defective.

Contractor: _____

Signature: _____ **Date:** _____

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

Progress Estimate - Lump Sum Work

Contractor's Application for Payment

Owner: Worcester County
 Engineer: George, Miles & Buhr, LLC
 Contractor: _____
 Project: Riddle Farm WWTP Equipment Upgrades
 Contract: Riddle Farm WWTP Equipment Upgrades

Owner's Project No.: _____
 Engineer's Project No.: 220047
 Contractor's Project No.: _____

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

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

Progress Estimate - Lump Sum Work

Contractor's Application for Payment

Owner:	Worcester County	Owner's Project No.:	
Engineer:	George, Miles & Buhr, LLC	Engineer's Project No.:	220047
Contractor:		Contractor's Project No.:	
Project:	Riddle Farm WWTP Equipment Upgrades		
Contract:	Riddle Farm WWTP Equipment Upgrades		

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

Progress Estimate - Unit Price Work

Contractor's Application for Payment

Owner: Worcester County
 Engineer: George, Miles & Buhr, LLC
 Contractor: _____
 Project: Riddle Farm WWTP Equipment Upgrades
 Contract: Riddle Farm WWTP Equipment Upgrades

Owner's Project No.: _____
 Engineer's Project No.: 220047
 Contractor's Project No.: _____

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

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

Progress Estimate - Unit Price Work

Contractor's Application for Payment

Owner: Worcester County
 Engineer: George, Miles & Buhr, LLC
 Contractor: _____
 Project: Riddle Farm WWTP Equipment Upgrades
 Contract: Riddle Farm WWTP Equipment Upgrades

Owner's Project No.: _____
 Engineer's Project No.: 220047
 Contractor's Project No.: _____

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

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

Stored Materials Summary

Contractor's Application for Payment

Owner: Worcester County
Engineer: George, Miles & Buhr, LLC
Contractor: _____
Project: Riddle Farm WWTP Equipment Upgrades
Contract: Riddle Farm WWTP Equipment Upgrades

Owner's Project No.: _____
Engineer's Project No.: 220047
Contractor's Project No.: _____

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

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

DIVISION 00 – BIDDING AND CONTRACT REQUIREMENTS

SECTION 00625 - CERTIFICATE OF SUBSTANTIAL COMPLETION

Owner: **Worcester County**

Engineer: **George, Miles & Buhr, LLC**

Contractor:

Project: **Riddle Farm WWTP Equipment Upgrades**

Contract Name: **Riddle Farm WWTP Equipment Upgrades**

Owner’s Project No.:

Engineer’s Project No.: **220047**

Contractor’s Project No.:

This Preliminary Final Certificate of Substantial Completion applies to:

All Work The following specified portions of the Work:

Date of Substantial Completion:

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

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

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

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

Amendments to Owner’s Responsibilities: None As follows:

Amendments to Contractor’s Responsibilities: None As follows:

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

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

Engineer

By *(signature)*: _____

Name *(printed)*: _____

Title: _____

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DIVISION 00 – BIDDING AND CONTRACT REQUIREMENTS

SECTION 00626 - NOTICE OF ACCEPTABILITY OF WORK

Owner: **Worcester County** Owner’s Project No.:
Engineer: **George, Miles & Buhr, LLC** Engineer’s Project No.: **220047**
Contractor: Contractor’s Project No.:
Project: **Riddle Farm WWTP Equipment Upgrades**
Contract Name: **Riddle Farm WWTP Equipment Upgrades**
Notice Date: Effective Date of the Construction Contract:

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

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

By (signature): _____
Name (printed): _____
Title: _____

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SECTION 00700
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

EJCDC® C-700, Standard General Conditions of the Construction Contract.

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

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 three (3) years 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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DIVISION 00 – BIDDING AND CONTRACT REQUIREMENTS

SECTION 00800

SUPPLEMENTARY CONDITIONS OF THE CONSTRUCTION CONTRACT

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SUPPLEMENTARY CONDITIONS OF THE CONSTRUCTION CONTRACT

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

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

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

ARTICLE 1—DEFINITIONS AND TERMINOLOGY

SC-1.01.A.8 – Add the following at the end of the Paragraph:

The Change Order form to be used on this Project is EJCDC C-941 (2018). Agency approval is required before Change Orders are effective.

SC-1.01.A.10 – Delete the definition of "Claim" and replace with the following definition:

Claim – (a) A demand or assertion by Owner directly to Contract in accordance with the provisions set forth herein; or (b) a demand or assertion by Contractor directly to Owner in accordance with the provisions set forth herein. A demand for money or services by a third party is not a Claim.

SC-A1.01.A.23 – Insert the following language in the definition of "Field Order" after "Engineer":

And approved or ratified by Owner.

SC-1.01.A.50 – Add the following at the end of the Paragraph:

The Work Change Directive form to be used on this Project is EJCDC C-940 (2018). Agency approval is required before a Work Change Directive is issued. A work change directive cannot change price or Contract Times without a subsequent Change Order.

SC-1.01.A.51 – Add the following new paragraph:

"Conditional Acceptance" – a sixty (60) day period after Substantial Completion in which the Owner will have full use of the facilities but the Contractor shall maintain all portions of the Work included in the Contract.

SC-1.01.A.52 – Add the following new paragraph:

"Or-equal" – Or approved equal.

SC-1.01.A.53 – Add the following new paragraph:

"Abnormal Weather Conditions" – Conditions of extreme or unusual weather for a given region, elevation, or season as determined by Engineer. Extreme or unusual weather that is typical for a given region, elevation, or season should not be considered Abnormal Weather Conditions.

ARTICLE 2—PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

SC-2.01 Delete Paragraph 2.01.C. in its entirety.

2.02 *Copies of Documents*

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

Owner shall furnish to Contractor **five** printed copies of the Contract Documents (including one fully signed counterpart of the Agreement), and one copy in electronic portable document format (PDF).

2.06 *Electronic Transmittals*

SC-2.06 Delete

ARTICLE 3—CONTRACT DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 *Intent*

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

3.03 *Reporting and Resolving Discrepancies*

SC-3.03.A.2 Delete “by Engineer” in the last sentence and replace it with “by Owner”.

3.04 *Requirements of the Contract Documents*

SC-3.04.A Remove the words “and Owner” from the first sentence of 3.04.A. Delete the last sentence and replace with:

“Unless such matter is subject to the exceptions listed in subsection (c) below, Engineer shall review and submit to Owner a recommendation regarding any matters in question regarding the requirements of the Contract Documents. Within ten days of receipt of Engineer’s recommendation, Owner shall issue a final decision regarding said matter, unless Owner gives notice of an extension of the deadline for said recommendation.”

SC-3.04.C Replace the words “a decision or interpretation” with “recommendation” in the first sentence. Delete the last sentence and replace with:

“If Contractor is dissatisfied with Owner’s decision, Contractor may pursue resolution as provided in Article 12.”

ARTICLE 4—COMMENCEMENT AND PROGRESS OF THE WORK

SC-4.01.A – Delete the first two sentences and replace with:

The Contract Times will commence to run on the day indicated in the Notice to Proceed.

SC-4.01.A - Delete the last sentence of paragraph.

4.02 *Starting the Work*

SC-4.02-A At the end of the first sentence add:

“in accordance with the Notice to Proceed.”

4.05 *Delays in Contractor’s Progress*

SC-4.05 Paragraph is mandatory for WWD projects.

SC-4.05.A Delete “and Contract Price” at the end of the sentence.

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

5. *Weather-Related Delays*

- a. If “abnormal weather conditions” as set forth in Paragraph 4.05.C.2 of the General Conditions are the basis for a request for an equitable adjustment in the Contract Times, such request must be documented by data substantiating each of the following: 1) that weather conditions were abnormal for the period of time in which the delay occurred, 2) that such weather conditions could not have been reasonably anticipated, and 3) that such weather conditions had an adverse effect on the Work as scheduled. **Extreme or unusual weather that is typical for a given region, elevation, or season should not be considered abnormal weather conditions. Requests for time extensions due to abnormal weather conditions will be submitted to the Engineer within five days of the end of the abnormal weather condition event. It is the responsibility of the Contractor to provide the information listed in SC 4.05.C.5.b.**
- b. The existence of abnormal weather conditions will be determined on a month-by-month basis in accordance with the definition “Abnormal Weather Conditions” in SC-1.01.A.55.

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

5.01 *Availability of Lands*

SC-5.01.B Delete

SC-5.01 Add the following new paragraphs immediately after paragraph 5.01-C:

D. All permanent construction will be within lands of the Owner, public rights-of-way, or within easements through private property acquired by the Owner. The Contractor shall confine his operation strictly within the limits of the rights-of-way and construction areas. In the event the Contractor allows construction to occur outside the lands of the Owner, public rights-of-way, or within easements through private property, Contractor shall be responsible for correcting said error through relocating construction, obtaining corrective deeds or easements, or through other appropriate measures as may be agreed upon by the Owner. The Contractor shall replace in-kind and repair all damages within the prescribed areas equal to or superior to original conditions. Work will be permitted outside of the prescribed easement area if written permission to occupy additional ground is provided by the owner of the affected property. The Contractor shall be responsible for replacement of any property damaged outside of the prescribed area. Trees and other natural obstructions shall not be removed without written permission from the owner of the property. Such additional agreements shall be promptly sent to Engineer, in advance of construction, for filing.

5.03 *Subsurface and Physical Conditions*

SC-5.03 Delete Paragraphs 5.03.A and 5.03.B in their entirety and insert the following:

- A. Unless provided in the Section 00320 of the specifications, no reports of explorations or tests of subsurface conditions at or adjacent to the Site, or drawings of physical conditions relating to existing surface or subsurface structures at the Site, are known to Owner. Any Technical Data provided in Section 00320 is not part of the Contract Documents.

5.05 *Underground Facilities*

SC-5.05.A.5 Insert the following into Paragraph 5 after the first sentence:

If Contractor damages any utilities, he or she shall immediately take such measures as are required to prevent further damage and to protect life and property. The Contractor shall also immediately notify the affected utility company and make permanent repair of the damage. The Contractor shall pay for all damages incurred, as well as for the full repair and restoration thereto at the sole expense of Contractor with no expense being incurred by Worcester County.

5.06 *Hazardous Environmental Conditions at the Site*

SC-5.06 Delete Paragraphs 5.06.A and 5.06.B in their entirety and insert the following:

- A. Unless provided in the Appendix of the specifications, no reports or drawings related to Hazardous Environmental Conditions at the Site are known to Owner.
- B. Deleted.

SC-5.06.I Delete paragraph in its entirety.

SC-5.06.J Delete the following sentence:

Nothing in this paragraph 5.06.J shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

ARTICLE 6—BONDS AND INSURANCE

6.01 *Performance, Payment, and Other Bonds*

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

1. The correction period specified as one year after the date of Substantial Completion in Paragraph 15.08.A of the General Conditions is hereby revised to be 3 years after Substantial Completion.

SC-6.01.E Remove "20 days" in the first sentence, and replace with, "five business days".

SC-6.01-F Replace "Article 16" with "Section 16.02".

6.02 *Insurance—General Provisions*

SC-6.02.A Remove "Owner and" from the sentence.

SC-6.02.B Delete in its entirety and replace with the following:

All insurance required by the Contract to be purchased and maintained by Contractor shall be obtained from insurers that are allowed to do business in Maryland, with a Best's Financial Strength Rating of "A-" or better, and a Financial Size Category of "Class VII" or better in the latest evaluation of the A.M. Best Company, unless otherwise approved by Owner.

SC-6.02.D Replace the first sentence of 6.02.D with the following:

Prior to the start of Work under this Contract, Contractor shall deliver to Owner, with copies for each named insured and additional insured (as identified in the Article, in the Supplementary Conditions, or elsewhere in the Contract), certificates of insurance and required endorsements establishing that Contractor has obtained and is maintaining the policies, coverages, and endorsements required by the Contract, that are satisfactory to and approved by Owner.

SC-6.02.E Delete in its entirety.

SC-6.02-F Replace "Owner or Contractor" with "Owner" in both instances of this paragraph.

Replace "the other party's" with "Contractor's".

SC-6.02.H.1. Delete SC-6.02.H.1. in its entirety and replace with:

Contractor shall require all Subcontractors to obtain and maintain workers' compensation, employers' liability, commercial general liability, business auto liability, and contractors' pollution liability (optional), contractors' professional liability (optional) to the same extent required of Contractor, including additional insured status for persons required under Contractor's commercial general liability. Prior to the start of Work under this Contract, Contractor will furnish Subcontractors' certificates of insurance and required endorsements to Owner.

SC-6.02.I Replace "either party" and "such party" with "Contractor" and "other party" with "Owner".

SC-6.02.K Delete Paragraph 6.02.K in its entirety and replace with the following:

Without prejudice to any other right or remedy, if Contractor has failed to obtain required insurance, Owner may elect to obtain equivalent insurance, to protect Owner's interests at the expense of Contractor, and the Contract Price shall be adjusted accordingly.

SC 6.02.L Add the following sentence to the end of paragraph 6.02.L:

Nothing in this subsection shall be construed to allow insurance coverage, as required by the Contract Documents, to lapse during this Contract, unless and until specific, written authorization for alternative coverage is issued by Owner.

SC-6.02.N Add the following paragraphs immediately after 6.02.N:

O. No acceptance and/or approval of any insurance by Owner shall be construed as relieving or excusing Contractor, or its surety, or its bonds from any liability or obligation imposed upon them by the provisions of the Contract.

- P. Any deductibles or retentions of \$5,000 or greater (\$10,000 for umbrella excess liability) shall be disclosed by Contractor and are subject to Owner’s written approval. Such approval will not be unreasonably withheld. Any deductible or retention amounts elected by Contractor or its Subcontractors or imposed by Contractor’s or Subcontractor’s insurer(s) shall be the sole responsibility of Contractor or its Subcontractors and are not chargeable as expenses.
- Q. For any "claims-made" liability insurance purchased by Contractor or Subcontractors, the purchaser must comply with the following additional conditions. The limits of liability and the extensions to be included remain the same.
1. The retroactive date (if any) of such “claims-made” coverage can be no later than the earlier of the Effective Date of the Contract or the commencement of the Work under the Contract and either 2 or 3 below;
 2. The Contractor or Subcontractor shall provide certificates of insurance evidencing the claims-made insurance for a period of three (3) years after Substantial Completion; or
 3. The Contractor or Subcontractor shall purchase a three (3) year extended reporting period endorsement for each such “claims-made” policy in force as of the date the Contract terminates or expires, whichever is earlier and evidence the purchase of the extended reporting period endorsement by means of a certificate of insurance and a copy of the endorsement itself.
- R. If Owner is damaged by the failure or neglect of Contractor to obtain and maintain insurance as described and required herein, without so notifying Owner, then Contractor shall bear all reasonable costs properly attributable thereto.

6.03 *Contractor’s Insurance*

SC-6.03.A Replace “Worker’s” with “Workers”.

SC-6.03.C Replace the first sentence of 6.03.C with the following:

- C. Additional Insureds: The Contractor’s commercial general liability, business auto liability, umbrella or excess liability, pollution liability, and unmanned aerial vehicle liability policies, if required by this Contract, must:

SC-6.03.C.1. Replace 6.03.C.1. with the following:

1. include and list as additional insureds Owner and Engineer, and their respective elected and appointed officials, officers, directors, members, partners, employees, and agents.

SC-6.03. Add the following after C.:

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

Workers’ Compensation and Related Policies	Policy limits of not less than:
Workers’ Compensation	

Workers' Compensation and Related Policies	Policy limits of not less than:
State	Statutory
Applicable Federal (e.g., Longshoreman's)	Statutory
Foreign voluntary workers' compensation (employer's responsibility coverage), if applicable	Statutory
Jones Act (if applicable)	
Bodily injury by accident—each accident	\$
Bodily injury by disease—aggregate	\$
Employer's Liability	
Each accident	\$1,000,000
Each employee	\$1,000,000
Policy limit	\$1,000,000
Stop-gap Liability Coverage	
For work performed in monopolistic states, stop-gap liability coverage must be endorsed to either the worker's compensation or commercial general liability policy with a minimum limit of:	\$

- E. *Commercial General Liability—Claims Covered:* Contractor shall purchase and maintain commercial general liability insurance, covering all operations by or on behalf of Contractor, on an occurrence basis, against claims for:
1. damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees,
 2. damages insured by reasonably available personal injury liability coverage, and
 3. damages because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom.
- F. *Commercial General Liability—Form and Content:* Contractor's commercial general liability policy must be written on an Insurance Services Organization, Inc. (ISO) commercial general liability form (CG 00 01 occurrence form) and include the following coverages and endorsements:
1. Products and completed operations coverage.
 - a. Such insurance must be maintained for three (3) years after Substantial Completion.
 - b. Contractor shall furnish Owner and each other additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract) evidence of continuation of such insurance for three (3) years after Substantial Completion.
 2. Blanket contractual liability coverage, including but not limited to coverage of Contractor's contractual indemnity obligations in Paragraph 7.18.
 3. Severability of interests and no insured-versus-insured or cross-liability exclusions.
 4. Underground, explosion, and collapse coverage.
 5. Personal injury coverage.

6. Additional insured endorsements that include both ongoing operations and products and completed operations coverage through ISO Endorsements CG 20 10 and CG 20 37 (together). If Contractor demonstrates to Owner that the specified ISO endorsements are not commercially available, then Contractor may satisfy this requirement by providing equivalent endorsements.
 7. For design professional additional insureds, ISO Endorsement CG 20 32 “Additional Insured—Engineers, Architects or Surveyors Not Engaged by the Named Insured” or its equivalent.
- G. *Commercial General Liability—Excluded Content:* The commercial general liability insurance policy, including its coverages, endorsements, and incorporated provisions, must not include any of the following:
1. Any modification of the standard definition of “insured contract” (except to delete the railroad protective liability exclusion if Contractor is required to indemnify a railroad or others with respect to Work within 50 feet of railroad property).
 2. Any exclusion for water intrusion or water damage.
 3. Any provisions resulting in the erosion of insurance limits by defense costs other than those already incorporated in ISO form CG 00 01.
 4. Any exclusion of coverage relating to earth subsidence or movement.
 5. Any exclusion for the insured’s vicarious liability, strict liability, or statutory liability (other than worker’s compensation).
 6. Any limitation or exclusion based on the nature of Contractor’s work.
 7. Any professional liability exclusion broader in effect than the most recent edition of ISO form CG 22 79.
- H. *Commercial General Liability—Minimum Policy Limits*

Commercial General Liability	Policy limits of not less than:
General Aggregate	\$2,000,000
Products—Completed Operations Aggregate	\$1,000,000
Personal and Advertising Injury	\$1,000,000
Bodily Injury and Property Damage—Each Occurrence	\$1,000,000

- J. *Business Auto Liability:* Contractor shall purchase and maintain business auto liability insurance for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance, or use of any auto.

Business Auto Liability	Policy limits of not less than:
Bodily Injury	
Each Person	\$1,000,000
Each Accident	\$1,000,000
Property Damage	
Each Accident	\$1,000,000

Business Auto Liability	Policy limits of not less than:
[or]	
Combined Single Limit	
Combined Single Limit (Bodily Injury and Property Damage)	\$1,000,000

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

Excess or Umbrella Liability	Policy limits of not less than:
Each Occurrence	\$1,000,000
General Aggregate	\$1,000,000

- L. *Using Umbrella or Excess Liability Insurance to Meet CGL and Other Policy Limit Requirements:* Contractor may meet the policy limits specified for employers' liability, commercial general liability, and business auto liability through the primary policies alone, or through combinations of the primary insurance policy's policy limits and partial attribution of the policy limits of an umbrella or excess liability policy that is at least as broad in coverage as that of the underlying policy, as specified herein. If such umbrella or excess liability policy was required under this Contract, at a specified minimum policy limit, such umbrella or excess policy must retain a minimum limit of **\$1,000,000.00** after accounting for partial attribution of its limits to underlying policies, as allowed above.
- M. *Contractor's Pollution Liability Insurance:* Contractor shall purchase and maintain a policy covering third-party injury and property damage, including cleanup costs, as a result of pollution conditions arising from Contractor's operations and completed operations. This insurance must be maintained for no less than three years after final completion.

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

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

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

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

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

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

- P. *Unmanned Aerial Vehicle Liability Insurance:* If Contractor uses unmanned aerial vehicles (UAV—commonly referred to as drones) at the Site or in support of any aspect of the Work, Contractor shall obtain UAV liability insurance in the amounts stated; name Owner, Engineer, and all individuals and entities identified in the Supplementary Conditions as additional insureds; and provide a certificate to Owner confirming Contractor's compliance with this requirement. Such insurance will provide coverage for property damage, bodily injury or death, and invasion of privacy.

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

- Q. *Other Required Insurance:*

6.04 *Builder's Risk and Other Property Insurance*

SC-6.04 Delete Paragraph 6.04.A, 6.04.B, 6.04.C, 6.04.D and 6.04.E of the General Conditions and substitute the following in its place:

For all property owned by Contractor and used in or a part of the Work under this Contract, Contractor may purchase all-risk (Special Form) property insurance for such property and any consequential loss of income and extra expense resulting from loss of or damage to Contractor's property, in amounts sufficient to protect Contractor's interests. To the extent permitted by law, Contractor waives all right of recovery from the City and its elected and appointed officials, agents, and employees for loss of or damage to Contractor's property and any consequential loss of income and extra expense. If Contractor elects to purchase insurance, such insurance will permit this waiver by endorsement or otherwise. If any property is to be transferred to the City as part of the

Scope of Work, the risk of loss shall remain with Contractor until the property has been accepted by the City, including property in storage or in transit.

SC-6.05 Delete Paragraph 6.05.A.1. in its entirety and replace it with:

1. Owner and Contractor waive all rights against each other and their respective elected and appointed officials, officers, directors, members, partners, employees, and agents, 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. Owner and Contractor waive all such rights against Engineer and its officers, directors, members, partners, employees, agents, under such policies for losses and damages caused.

ARTICLE 7—CONTRACTOR’S RESPONSIBILITIES

7.03 *Labor; Working Hours*

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

- C. Except as otherwise required for the safety and 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 shall be performed during working hours as defined below:

Work Hours:

Work will not be permitted on Saturday, Sunday, or holidays observed by Owner unless approval is given in response to a written request a minimum of 48 hours in advance of commencing work. Emergency repairs or actions are an obvious exception. Normal working hours shall consist of a nine hour work day performed between the hours of 7:00 a.m. and 5:00 p.m. Any requests by Owner to limit the Work on certain areas of the Site to certain hours of the day will be accommodated by Contractor. Extensions to the Contract Time will not be permitted, as these limited work hours have been accommodated in the Contract Time as set forth herein.

Overtime:

Overtime hours will be tracked for any work beyond the first 40 hours of the week. Subcontractors must work the same work hours as the Contractor. Owner will be responsible for payment of all inspection personnel for the first 40 hours per week. All overtime work beyond the first 40 hours of overtime for the entire projects’ duration must be paid by the Contractor.

Observed Holidays:

New Year’s Day	Martin Luther King Jr.’s Birthday
Good Friday	Memorial Day
Independence Day	Labor Day
Elections Day	Veterans Day
Thanksgiving Day	Day after Thanksgiving
Christmas Eve	Christmas Day

SC 7.06 *Substitutes*

SC-7.06.A.3.a.2 – Remove “and” from the end of paragraph.

SC-7.06.A.3.a.3 – Add “; and” to the end of paragraph.

SC 7.06.B Substitute the third sentence of 7.06.B with the following:

Engineer will make a recommendation to Owner regarding acceptability of “or equal” item.

In sentence four of 7.06.B, insert “subject to Owner’s approval” after ...and Engineer determines.

SC 7.06.D Replace “Engineer’s” with “Owner’s” in paragraph 7.06.D.

7.07 *Concerning Subcontractors and Suppliers*

SC-7.07.A – Amend by adding the following to the end of the paragraph:

The total amount of work subcontracted by the Contractor shall not exceed fifty percent of the Contract price without prior approval from the Owner, Engineer and Agency.

SC-7.07.E – Delete the second sentence of paragraph and insert the following in its place:

Owner may not require that Contractor use a specific replacement.

SC-7.07.F Delete paragraph in its entirety and replace with the following:

If the Owner or the Engineer refuses to accept any subcontractor, person, or organization or such list, the Contractor will submit an acceptable substitute, and the Contract price shall remain unchanged or shall be increased or decreased by the difference in cost occasioned by such substitution, and an appropriate change order, if necessary, shall be issued.

SC-7.07.G Delete paragraph in its entirety.

SC-7.07.K Delete paragraph and replace with the following:

K. All work performed for Contractor by a Subcontractor or Supplier will be pursuant to an appropriate agreement between Contractor and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Document for the benefit of Owner and Engineer. Whenever any such agreement is with a Subcontractor or Supplier who is listed as an additional insured on the property insurance provided in paragraph 6.05, the agreement between the Contractor and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against Owner, Contractor and all other individuals or entities identified in the Supplementary Conditions to be listed as insured or additional insured (and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them) for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, Contractor will obtain the same.

7.08 *Patent Fees and Royalties*

SC-7.08.A Delete and replace with the following:

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 a particular 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 shall be disclosed by Owner in the Contract Documents. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner, Engineer, Engineer's Consultants, and the officers, directors, appointed and elected officials, partners, employees or agents, and other consultants 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.

SC 7.08.B Delete in its entirety.

7.12 *Record Documents*

SC-7.12.A Amend paragraph by adding the following after "written interpretations and clarifications,":

Manufacturers' Certifications,

Insert "and Owner" to the end of the last sentence of the paragraph.

SC-7.12.B The following paragraphs are added after SC-7.12.A as follows:

B. All work shall be measured, by the Contractor, during installation and before covering and backfilling. All measurements shall be referenced to project vertical datum and stationing shown on the drawings. All measurements will be recorded and kept current until completion of the Work. Such measurement records shall be transmitted to the Engineer to check Applications for Payment. The Contractor shall field survey inverts for installed gravity sewer pipelines and submit the results along with the Application for Payment for that particular section of sewer. All field measurements for all forcemain record documents shall be updated each month and shall also be submitted with the Application for Payment for that particular section of forcemain. The surveys shall indicate the pipeline in question has been installed in accordance with the Contract Documents.

C. Contractor shall be responsible for recording, keeping, and monitoring Record Drawings of work constructed in the field. Record Drawings will be kept on hand in the Contractor's field office for inspection by the Engineer. Two sets of initial draft Record Drawings shall be issued to the Engineer no later than 14-days from the date of substantial completion.

7.13 *Safety and Protection*

SC – 7.13.A Insert the following after the first sentence of paragraph 7.13A:

Contractor shall review the tenets of his safety program with Owner and Engineer at the Pre-Construction Meeting, and review the program status at each progress meeting.

SC-7.13 The following paragraphs are added to modify paragraph 7.13 as follows:

K. Access during construction:

1.The Contractor shall schedule Work to minimize the time period during which vehicular access to each building or dwelling along the work route is prevented. The Contractor shall provide, at all times, safe pedestrian access to all building or dwellings, whether residential, commercial, or other.

2.Construction shall be scheduled to interfere as little as possible with traffic. Necessary barricades, suitable and sufficient danger signals, and signs in accordance with the Maryland Traffic Control Manual shall be provided for the protection of existing property and safety of the Public.

L. Protection of Property and Utilities:

1. The location of utilities, facilities, or structures that may be shown on the plans or encountered in the work are not guaranteed. Any inaccuracy or omission in such information shall not relieve the Contractor of his responsibility to protect such existing features from damage or unscheduled interruption of service.

2. The Contractor shall contact “Miss Utility” at (800) 257-7777 at least 48 hours prior to digging in the vicinity of existing underground utilities to have them located and marked.

3.The Contractor shall pay all charges levied by utility companies for work to locate, inspect, protect, relocate, replace, or repair overhead or underground utilities necessary for the construction of the project. The Owner assumes no responsibility for damages or downtime for the Contractor or their subcontractors resulting from the inadequate or negligent performance by utility locators.

4.The Contractor shall, at his own expense, locate, protect, and repair damages to all overhead and underground utilities whether shown by the drawings or not. The Contractor shall cooperate with the utility service, or governing agency to prevent the unscheduled interruption of utility services and facilities during repair or replacement.

5.The Contractor shall comply with the Utility Damage Prevention and Safety Act for the State of Maryland, Title 12, Maryland Code, Chapter 117.

M. Safety Plan:

1. The Contractor shall follow all nationally recognized Safety, Health and Environmental standards in fulfillment of this Contract.
2. The Contractor shall erect and maintain, as required by the existing conditions and performance of this Contract reasonable safeguards for safety and protection of the Site, during all hours for the durations of the project. Reasonable safeguards, include but are not limited to posting danger signs, erecting fences, adding spill containment, or constructing other physical barriers that will protect workers, bystanders, and the general public from hazards.
3. Contractor shall submit to Worcester County for review a project specific safety plan addressing his intended program for maintaining safety in accordance with the above referenced requirements.

7.15 *Emergencies*

SC-7.15.A Replace "Engineer" with "Owner" in the last sentence.

7.16 *Submittals*

SC-7.16.A.1.d Add new paragraph immediately after Paragraph 7.16.A.1.c:

F. Survey and Stake-out Submittals

1. All surveying and stake-out and rim elevation work shall be done by persons licensed by the State of Maryland to perform such work.
2. Work done by the Contractor without having first established proper lines and grade, or work done by him to incorrect line and grade, may be ordered removed and replaced at no increase in contract price.
3. Any bench marks destroyed through or as a direct result of the Contractor's construction operations shall be replaced and/or restored at his expense with no additional cost to the Owner.

7.18 *Indemnification*

Replace the first sentence of 7.18.A with:

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, defend and hold harmless Owner and Engineer, and the elected and appointed officials, 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 performance of the Work, provided that any such claim, cost, loss, or damage 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 but only to the extent 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. Contractor shall be liable, regardless of whether or not such claims, damages, losses, injuries, or expenses are caused in part by a party indemnified hereunder.

Owner shall cooperate and assist the indemnifying party in the defense of the claim. The indemnifying party shall bear the cost of and have the right to control the defense and shall have the right to select counsel after consulting with the indemnified party. Contractor shall not settle or compromise any claim without the written consent of Owner.

7.18.B is deleted and replaced with the following:

B. In any and all claims against Owner, Engineer, Engineer's Consultants, and the elected and appointed officials, officers, directors, partners, employees, agents and other consultants and subcontractors of each by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, and 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, Contractor agrees to expressly waive its immunity, if any, as a complying employer under the Workers' Compensation law or statute, but only to the extent that such immunity would bar or affect recovery under or enforcement of any indemnification obligation contained herein. This waiver applies to the Maryland Workers' Compensation Act, or any other applicable state Workers' Compensation law or statute.

7.19 *Delegation of Professional Design Services*

Delete this Section in its entirety.

7.20 *No Limitation of Liability*

Paragraph 7.20 is added to the Standard General Conditions as follows:

It is understood and agreed that any and all of the duties, liabilities, and/or obligations imposed upon or assumed by the Contractor and the Surety, or either of them, by or under the Contract Documents, shall be taken and construed to be cumulative, and that the mention of any specific duty, liability, or obligation imposed upon or assumed by the Contractor and/or the Surety under the Contract Documents shall not be taken or construed as a limitation or restriction upon any or all of the other duties, liabilities, and/or obligations imposed upon or assumed by the Contractor and/or the Surety by or under the Contract Documents.

ARTICLE 8—OTHER WORK AT THE SITE

8.01 *Other Work*

SC-8.01.B Delete paragraph in its entirety.

8.02 *Coordination*

SC-8.02 Delete Paragraph 8.02.A in its entirety and replace with the following:

Owner will make reasonable efforts to provide advance notice of any other work being performed or to be performed at or adjacent to the Site. Owner's failure to provide such notice will not be construed as a default of the Contract Documents. In such notice, Owner shall include the following:

8.03 *Legal Relationships*

SC-8.03.A Delete paragraph 8.03.A and replace with the following:

If, in the course of performing other work at or adjacent to the Site for Owner, the Owner's employees, or any other contractor working for Owner, 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 Times. Contractor must submit any Change Proposal seeking an equitable adjustment in 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 shall 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. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.

SC-8.03.B Delete this paragraph in its entirety.

ARTICLE 9—OWNER'S RESPONSIBILITIES

9.01 *Communications to Contractor*

SC-9.01.A Delete Paragraph in its entirety.

9.02 *Replacement of Engineer*

SC-9.02.A Delete Paragraph and insert the following language in lieu thereof:

Owner may at its discretion appoint an engineer to replace Engineer. The replacement engineer's status under the Contract Documents shall be that of the former Engineer.

9.06 *Insurance*

SC-9.06.A Delete Paragraph in its entirety.

9.11 *Evidence of Financial Arrangements*

SC-9.11.A Delete Paragraph in its entirety.

9.12 *Safety Programs*

SC-9.12.A Insert "in writing" to the end of the Paragraph.

ARTICLE 10—ENGINEER'S STATUS DURING CONSTRUCTION

10.03 *Resident Project Representative*

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

- C. The Resident Project Representative (RPR) will be Engineer's representative at the Site, **will act as directed by and under the supervision of the Engineer, and will confer with Engineer regarding RPR's actions.** RPR's dealings in matters pertaining to the Work in general will be

with Engineer and Contractor. RPR's dealings with Subcontractors will only be through or with the full knowledge or approval of Contractor. The RPR will:

1. *Conferences and Meetings:* Attend meetings with Contractor, such as preconstruction conferences, progress meetings, job conferences, and other Project-related meetings (but not including Contractor's safety meetings), and as appropriate prepare and circulate copies of minutes thereof.
2. *Schedules:* Review the progress schedule, schedule of Shop Drawing and Sample submittals, and Schedule of Values prepared by Contractor and consult with Engineer concerning acceptability.
3. *Safety Compliance:* Comply with Site safety programs, as they apply to RPR, and if required to do so by such safety programs, receive safety training specifically related to RPR's own personal safety while at the Site.
4. *Liaison*
 - a. Serve as Engineer's liaison with Contractor. Working principally through Contractor's authorized representative or designee, assist in providing information regarding the provisions and intent of the Contract Documents.
 - b. Assist Engineer in serving as Owner's liaison with Contractor when Contractor's operations affect Owner's on-Site operations.
 - c. Assist in obtaining from Owner additional details or information, when required for Contractor's proper execution of the Work.
4. *Review of Work; Defective Work*
 - a. Conduct On-Site observations of the Work to assist Engineer in determining, to the extent set forth in Paragraph 10.02 if the Work is in general proceeding in accordance with the Contract Documents.
 - b. Observe whether any Work in place appears to be defective.
 - c. Observe whether any Work in place should be uncovered for observation, or requires special testing, inspection, or approval.
5. *Interpretation of Contract Documents:* Report to Engineer when clarifications and interpretations of the Contract Documents are needed and transmit to Contractor clarifications and interpretations as issued by or approved by Owner.
6. *Shop Drawings and Samples:*
 - a. Record date of receipt of Samples and Contractor-approved Shop Drawings.
 - b. Receive Samples which are furnished at the Site by Contractor, and notify Engineer of availability of Samples for examination.
 - c. Advise Engineer and Contractor of the commencement of any portion of the Work requiring a Shop Drawing or Sample submittal for which RPR believes that the submittal has not been approved by Engineer.

7. Modifications: Consider and evaluate Contractor's suggestions for modifications in Drawings or Specifications and report such suggestions, together with RPR's recommendations, if any, to Engineer. Transmit to Contractor in writing decisions as issued by or approved by Owner.
8. Review of Work and Rejection of Defective Work:
 - a. Conduct on-Site observations of Contractor's work in progress to assist Engineer in determining if the Work is in general proceeding in accordance with the Contract Documents.
 - b. Report to Engineer whenever RPR believes that any part of Contractor's work in progress is defective, will not produce a completed Project that conforms generally to the Contract Documents, or will imperil the integrity of the design concept of the completed Project as a functioning whole as indicated in the Contract Documents, or has been damaged, or does not meet the requirements of any inspection, test or approval required to be made; and advise Engineer of that part of work in progress that RPR believes should be corrected or rejected or should be uncovered for observation, or requires special testing, inspection or approval.
9. Inspections, Tests, and System Start-ups:
 - a. Verify that tests, equipment, and systems start-ups and operating and maintenance training are conducted in the presence of appropriate Owner's personnel, and that Contractor maintains adequate records thereof.
 - b. Observe, record, and report to Engineer appropriate details relative to the test procedures and systems start-ups.
10. Records:
 - a. Prepare a daily report or keep a diary or log book, recording Contractor's hours on the Site, Subcontractors present at the Site, weather conditions, data relative to questions of Change Orders, Field Orders, Work Change Directives, or changed conditions, Site visitors, deliveries of equipment or materials, daily activities, decisions, observations in general, and specific observations in more detail as in the case of observing test procedures; and send copies to Engineer.
 - b. Record names, addresses, fax numbers, e-mail addresses, web site locations, and telephone numbers of all Contractors, Subcontractors, and major Suppliers of materials and equipment.
 - c. Maintain records for use in preparing Project documentation.
11. Reports:
 - a. Furnish to Engineer periodic reports as required of progress of the Work and of Contractor's compliance with the Progress Schedule and schedule of Shop Drawing and Sample submittals.
 - b. Draft and recommend to Engineer proposed Change Orders, Work Change Directives, and Field Orders. Obtain backup material from Contractor.

- c. Immediately notify Engineer of the occurrence of any Site accidents, emergencies, acts of God endangering the Work, force majeure or delay events, damage to property by fire or other causes, or the discovery of any Constituent of Concern or Hazardous Environmental Condition.
 12. Payment Requests: Review applications for payment with Contractor for compliance with the established procedure for their submission and forward with recommendations to Engineer, noting particularly the relationship of the payment requested to the Schedule of Values, Work completed, and materials and equipment delivered at the Site but not incorporated in the Work.
 13. Certificates, Operation and Maintenance Manuals: During the course of the Work, verify that materials and equipment certificates, operation and maintenance manuals and other data required by the Contract Documents to be assembled and furnished by Contractor are applicable to the items actually installed and in accordance with the Contract Documents, and have these documents delivered to Engineer for review and forwarding to Owner prior to payment for that part of the Work.
 14. Completion:
 - a. Participate in Engineer's visits to the Site to determine Substantial Completion, assist in the determination of Substantial Completion and the preparation of a punch list of items to be completed or corrected.
 - b. Participate in Engineer's final visit to the Site to determine completion of the Work, in the company of Owner and Contractor, and prepare a final punch list of items to be completed and deficiencies to be remedied.
 - c. Observe whether all items on the final list have been completed or corrected and make recommendations to Engineer concerning acceptance and issuance of the notice of acceptability of the work.
- D. The RPR will not:
 1. Authorize any deviation from the Contract Documents or substitution of materials or equipment (including "or-equal" items).
 2. Exceed limitations of Engineer's authority as set forth in the Contract Documents.
 3. Undertake any of the responsibilities of Contractor, Subcontractors, or Suppliers.
 4. Advise on, issue directions relative to, or assume control over any aspect of the means, methods, techniques, sequences, or procedures of construction.
 5. Advise on, issue directions regarding, or assume control over security or safety practices, precautions, and programs in connection with the activities or operations of Owner or Contractor.
 6. Participate in specialized field or laboratory tests or inspections conducted off-site by others except as specifically authorized by Engineer.
 7. Authorize Owner to occupy the Project in whole or in part.

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

SC-10.06 Rename Section “Engineer Recommendations”.

SC-10.06.A Delete Paragraph in its entirety and replace with:
Engineer will render recommendations as noted throughout the Contract Documents.

10.07 *Limitations on Engineer’s Authority and Responsibilities*

SC-10.07.A Add the following sentence to the end of paragraph:

This provision shall apply to Engineer’s authority or responsibility to Contractor, and such authority and responsibilities and decisions impacting Owner shall not be affected by this Paragraph 10.07.

SC-10.07.B Add the following sentence to the end of paragraph:

Engineer shall be responsible for reporting to Owner any failures of Contractor with respect to the Contract Documents of which Engineer becomes or should have become aware through reasonably diligent observation or inspection.

SC-10.07.D Remove the words “only” and “generally” from the first sentence.

SC-10.07.D Add the following sentence to the end of the paragraph:

To the extent that Engineer is able to or should be able to discern any error or omission in the exercise of its professional standard of care, Engineer will be responsible for any failure to fulfill this obligation to Owner.

ARTICLE 11—CHANGES TO THE CONTRACT

11.01 *Amending and Supplementing the Contract*

SC-11.01.A Restate the sentence to read:

The Contract Documents may be amended or supplemented by a Change Order.

SC-11.01.B Delete paragraph in its entirety.

SC-11.01.C Delete paragraph in its entirety.

11.02 *Change Orders*

SC-11.02.A Replace “shall” with “may” in the second sentence of this paragraph.

SC-11.02.C Add new paragraph immediately after Paragraph 11.02.B:

C. The Engineer or Owner shall contact the Agency for concurrence on each Change Order prior to issuance. All Contract Change Orders must be concurred on (signed) by Agency before they are effective.

11.03 *Work Change Directives*

SC-11.03.A.2 Add new Paragraph 11.03.A.2 immediately after Paragraph 11.03.A, which shall be renamed Paragraph 11.03.A.1:

2. The Engineer or Owner shall contact the Agency for concurrence on each Work Change Directive prior to issuance. Once authorized by Owner, a copy of each Work Change Directive shall be provided by Engineer to the Agency.

11.05 *Owner-Authorized Changes in the Work*

SC-11.05.B Add the following at the end of this paragraph:

For Owner-authorized changes in the Work, the Contractor will provide the Manufacturer's Certification(s) for materials subject to American Iron and Steel requirements except when sole-source is specified, in which case the Engineer will provide the Manufacturer's Certification(s).

11.07 *Change of Contract Price*

SC-11.07.A Delete Paragraph in its entirety and insert the following language in lieu thereof:

A. The Contract Price may only be changed by Change Order. Any claim for an increase or decrease in the Contract Price shall be based on written notice delivered by the party making the claim to the other party and to Engineer promptly (but in no event later than twenty (20) days) after the occurrence of the event giving rise to the claim and stating the general nature of the claim. If such claim is made in connection with an extension of the Contract Time, such notice shall be in addition to the notice required under Paragraph 12.01. On or before the fifth day of the month succeeding that in which he has provided such notice, Contractor shall provide Owner and Engineer with an itemized statement of the details and amount of such claim and a written statement that the amount claimed covers all known amounts (direct, indirect, and consequential) to which the claimant is entitled as a result of the occurrence of said event. No claim for an adjustment in the Contract Price will be valid if not submitted in accordance with this Paragraph 12.01.A.

SC-11.07.B.1 Delete paragraph in its entirety and replace with:

1. The value of the work covered by a change order or any Claim for an adjustment in the Contract Price will be determined as follows:
2. Where the Work is not covered by unit prices contained in the Contract Bid, the cost of the Work shall be determined on a time and material basis, plus a Contractor's fee for overhead and profit. Said Contractor's fee shall be determined as follows:
 - a. For Work performed by the General Contractor, the Contractor's overhead and profit fee shall be 10%.
 - b. For Work performed by a subcontractor, the subcontractor's overhead and profit fee shall be 10% and the General Contractor's fee shall be 5%.

SC-11.07.B.2 Delete paragraph in its entirety.

SC-11.07.B.3 Delete paragraph in its entirety.

SC-11.07.C Delete section in its entirety.

11.09 *Change Proposals*

SC-11.09.C – Replace this section in its entirety with the following:

Owner will consider Engineer's recommendation in its decision, but Owner shall make the final decision with respect to any Change Proposal. Owner's decision will be final and binding unless the Contractor appeals the decision by filing a Claim under Article 12.

11.10 *Notification to Surety*

SC-11.10.A Add the following to the end of the paragraph:

If Contractor does not give this notice, Contractor will be solely responsible for any damages or losses to Owner resulting from said failure to give notice. Owner may apply a set-off against any funds owed to Contractor to collect such damages or losses and shall be permitted to bring suit if Contractor fails to reimburse Owner for any amounts owed.

ARTICLE 12—CLAIMS

12.01 *Claims*

SC 12.01.A.1 Delete the sentence and replace with:

Appeals by Contractor of Owner's decisions regarding Change Proposals;

SC 12.01.A.3 Delete sentence in its entirety.

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

13.01 *Cost of the Work*

SC-13.01.B.1 Insert "in writing" to the end of the last sentence in the paragraph.

SC-13.01B.4 Add to the end of the sentence "and previously authorized to be retained in writing by Owner in writing".

13.02 *Allowances*

SC-13.02.C – Delete paragraph in its entirety and insert "Deleted".

13.03 *Unit Price Work*

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

E. *Adjustments in Unit Price*

1. Contractor or Owner shall be entitled to an adjustment in the unit price with respect to an item of Unit Price Work if:
 - a. the extended price of a particular item of Unit Price Work amounts to 20 percent or more of the Contract Price (based on estimated quantities at the time of Contract formation) and the variation in the quantity of that particular item of Unit Price Work actually furnished or performed by Contractor differs by more than 25 percent from the estimated quantity of such item indicated in the Agreement; and
 - b. Contractor's unit costs to perform the item of Unit Price Work have changed materially and significantly as a result of the quantity change.
2. The adjustment in unit price will account for and be coordinated with any related changes in quantities of other items of Work, and in Contractor's costs to perform such other Work, such that the resulting overall change in Contract Price is equitable to Owner and Contractor.

3. Adjusted unit prices will apply to all units of that item.

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

SC-14.03.B Delete the existing sentence and replace with the following:

Engineer has the authority to make recommendations to Owner whether Work is defective, and Owner may then reject defective Work.

SC-14.03.G – Add new paragraph immediately after Paragraph 14.03.F:

G. Installation of materials that are non-compliant with American Iron and Steel requirements shall be considered defective work.

14.04 *Acceptance of Defective Work*

SC-14.04.A Add the following sentence to the end of the paragraph:

In addition, Owner may require Contractor to provide a bond or other security in a form acceptable to Owner prior to acceptance of any defective Work.

14.05 *Uncovering Work*

SC-14.05.A In the first sentence, remove “has the authority” and replace with “may recommend to Owner”.

SC-14.05.C Insert “and Owner concurs with Engineer’s recommendation,” after “or tested by others” in the first sentence.

14.08 *Punch List Work*

SC-14.08.A Add the following paragraph to New Section 14.08:

In addition to Corrective Work or repair of Defective Work, the Owner shall exercise the rights and remedies described in Paragraphs 14.07 for Punch-List Work items that are not completed within the time period stipulated in the Punch-List.

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

15.01 *Progress Payments*

SC-15.01.B.4 – Add the following language at the end of paragraph:

No payments will be made that would deplete the retainage, place in escrow any funds that are required for retainage or invest the retainage for the benefit of the Contractor.

SC-15.01.B.5 – Add new paragraph immediately after Paragraph 15.01.B.4:

5. The Application for Payment form to be used on this Project is EJCDC® C-620. The Agency must approve all Applications for Payment before payment is made.

SC-15.01.B.6 – Add new paragraph immediately after Paragraph 15.01.B.5:

6. By submitting an Application for Payment based in whole or in part on furnishing equipment or materials, Contractor certifies that such equipment and materials are compliant with American Iron and Steel requirements. Manufacturer’s Certification letter

or materials satisfy this requirement. Refer to Manufacturer's Certification Letter provided in these Contract Documents.

SC 15.01.C.2 Delete the phrase "to the best of Engineer's knowledge, information, and belief" from the first sentence.

SC-15.01.C.2.d – Add the following new paragraph immediately after Paragraph 15.01.C.2.c:

d. The materials presented for payment in an Application for Payment comply with American Iron and Steel requirements.

SC-15.01.C.3.b- After the phrase "between the parties", insert "unrelated to the portion of the Work under review".

SC-15.01.C.4 Delete the first sentence and replace with the following:

Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of or Owner's payment of any payment, including final payment, will impose responsibility on Engineer or Owner.

SC-15.01.D.1 – Delete paragraph in its entirety and insert the following in its place:

The Application for Payment with Engineer's recommendations will be presented to the Owner and Agency for consideration. If both the Owner and Agency find the Application for Payment acceptable, the recommended amount less any reduction under the provisions of Paragraph 15.01.E will become due thirty (30) days after the Application for Payment is presented to the Owner, and the Owner will make payment to the Contractor. In the event the 30th day is a weekend or City holiday; payment can be expected on the previous workday. Upon receipt of the check, Owner will notify the Contractor by telephone that the check is ready for pickup or delivery.

SC-15.01.E.2-Delete the word "immediate" from the first sentence.

SC-15.02.A – Amend paragraph by striking out the following text: "7 days after" and insert "no later than the subsequent Application for Payment submission."

15.03 *Substantial Completion*

SC-15.03.A – Modify by adding the following after the last sentence:

Contractor shall also submit the General (Prime) Contractor's Certification of Compliance certifying that to the best of the Contractor's knowledge and belief all substitutes, equals, and all Iron and Steel products proposed in the Shop Drawings, Change Orders, and Partial Payment Estimates, and those installed for the Project, are either Produced in the United States or are the subject of an approved waiver under Section 746 of Title VII of the Consolidated Appropriations Act of 2017 (Division A - Agriculture, Rural Development, Food and Drug Administration, and Related Agencies Appropriations Act, 2017) and subsequent statutes mandating domestic preference.

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

1. If some or all of the Work has been determined not to be at a point of Substantial Completion and will require re-inspection or re-testing by Engineer, the cost of such re-inspection or re-testing, including the cost of time, travel and living expenses, will be paid by Contractor to Owner. If Contractor does not pay, or the parties are unable to

agree as to the amount owed, then Owner may impose a reasonable set-off against payments due under this Article 15.

SC-15.03.C Delete all language after sentence two and replace with the following:

Owner shall have 14 days after receipt of the preliminary certificate during which to make written objection to Engineer as to any provision of the certificate or attached punch list. Engineer will have 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, 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 Owner requested.

SC-15.03.F Add the following new paragraph after 15.03-F:

G. Conditional Acceptance

- 1. Upon Substantial Completion a sixty (60) day Conditional Acceptance period begins. During this period, the Owner will have full use of the facilities. The Contractor, at his entire cost and expense, shall maintain all portions of the Work included in this Contract including seeding and pavement restoration to meet the requirements of these specifications for and during the period sixty (60) days from and after the date of Substantial Completion of the entire Work by the Owner and, in addition, shall at his entire cost and expense, make all repairs and replacements of the Work and appurtenances which may become necessary in the judgement of the Engineer at any time or times during said sixty (60) day period on account of any failures or defects in said Work and appurtenances due to improper Work done or materials furnished by the Contractor within twenty-four (24) hours of having received notice from the Owner to do so. Final Inspection and Final Application for Payment, as outlined in the General Conditions, shall not take place until the expiration of the Conditional Acceptance period.**
- 2. The Owner shall have the right to enter the premises at any time for the purpose of doing work not covered by the Contract Documents. This provision shall not be construed as relieving the Contractor of the sole responsibility for the care and protection of the Work, or the restoration of any damaged Work except as such may be caused by agents or employees of the Owner.**

15.05 Final Inspection

SC-15.05.A is modified as follows:

At the beginning of the first sentence ADD At the end of the Conditional Acceptance period or, upon written notice from CONTRACTOR that the entire work or agreed upon portion thereof is complete, whichever occurs later Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection by Owner and Engineer reveals that the Work, or agreed portion thereof, is incomplete or defective.

15.06 *Final Payment*

SC 15.06.A In the first sentence, after “operating instruction” insert “all reports required under the Contract Documents”.

SC 15.06.A.2 Add new subsection f.:

- f. Satisfactory evidence that all subcontractors have been paid, except for any payment subject to dispute, in which case Owner may withhold 150% of amount withheld by Contractor in its dispute with subcontractor.

SC 15.06.D Insert “and Owner’s agreement to final payment” after “Engineer’s written recommendation”.

SC 15.06.E Insert “to the extent Owner agrees with said amount” after “the amount recommended by Engineer,”.

ARTICLE 16—SUSPENSION OF WORK AND TERMINATION

16.04 *Contractor May Stop Work or Terminate*

SC-16.04.A Delete item 2 within the paragraph.

SC-16.04.A Change “30 days” to “60 days” in item A.3.

ARTICLE 17—FINAL RESOLUTIONS OF DISPUTES

17.01 *Methods and Procedures*

SC-17.01 Add the following new section after 17.01.B:

- C. If the parties cannot reach an agreement in response to a dispute, the parties may pursue any remedy available under law or equity. No additional action or notice shall be required by this Contract.

ARTICLE 18—MISCELLANEOUS

18.01 *Giving Notice*

SC-18.01.A Add new subsection A.4:

Delivered standard US Mail.

SC-18.11 – Add new paragraph immediately after Paragraph 18.10:

18.11 Tribal Sovereignty

- A. No provision of this Agreement will be construed by any of the signatories as abridging or debilitating any sovereign powers of the [*insert name of Tribe*] Tribe; affecting the trust-beneficiary relationship between the Secretary of the Interior, Tribe, and Indian landowner(s); or interfering with the government-to-government relationship between the United States and the Tribe.

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DIVISION 00 – BIDDING AND CONTRACT REQUIREMENTS

CONTRACT CONDITIONS

SECTION 00810

SPECIAL PROVISIONS

1.01 GENERAL:

- A. The following Special Provisions shall take precedence over the Plans and other Sections of these specifications.
- B. This section includes:
- a. Safety
 - b. Codes, Rules, Permits and Fees
 - c. Time for Completion and Liquidated Damages
 - d. Working Period and Overtime
 - e. Interface with Existing Facilities
 - f. Contractor's Sequence of Construction

1.02 SAFETY:

- A. The Contractor shall comply, within the prices bid and without extra cost to the Owner, with all safety regulations or determinations issued by any agency of the Federal Government, including OSHA and the State of Maryland.

1.03 CODES, RULES, PERMITS AND FEES

A. General:

- 1. Local, State and Federal permits secured by the Owner will be included in DIVISION 00 Bidding and Contract Requirements or will be provided to the prospective Bidders by Addenda. The Contractor shall comply with the provisions of all such permits, and the cost of all work dictated by such permits shall be included in the prices bid.
- 2. The Contractor shall give all necessary notices, obtain all permits (except those referenced above) and pay all governmental taxes, fees and other costs in connection with the work, file all necessary plans, prepare all documents and obtain all necessary approvals of all governmental departments having jurisdiction, obtain all required Certificates of Inspection and Approval for the work and deliver same to the Engineer, except as otherwise noted herein.

B. Compliance: All materials furnished, and all work installed shall comply with the requirements of all governmental departments having jurisdiction.

1.04 TIME FOR COMPLETION AND LIQUIDATED DAMAGES:

A. The Agreement states the number of consecutive calendar days allowed from date of "Notice to Proceed" to date of substantial completion and final completion of the work under this contract.

B. For each calendar day the Contractor is in default in completing the contract as defined in the General Conditions, Supplemental General Conditions and the Bid, he shall pay to the Owner liquidated damages and associated costs for additional engineering services described in the Agreement.

1.05 WORKING PERIOD AND OVERTIME:

A. The Contractor will be allowed to work a defined schedule up to 40 hours per week Monday through Saturday, 52 weeks per year.

B. The Contractor shall not work on Sunday or Holidays observed by the Owner unless prior approval is secured from the Owner. If the Contractor desires to work longer than ten (10) hours per day or if he desires to work on Sunday or Holidays, he must first obtain the written permission of the Owner and Engineer.

C. Contractor may be required to work outside of the defined work schedule, to accommodate plant operating conditions for process isolations and taking tanks offline temporarily during low flow conditions.

D. Should the Contractor, for his convenience and not out of necessity to accommodate operations, extend his work beyond 40 hours per week, independent of inclement weather, any and all cost of weekend, holiday and/or overtime inspection, including but not limited to direct salaries, fringe benefits, overhead profit, administration and supervision, incurred by the Engineer, and/or, the Owner, will be the sole obligation of the Contractor. The overtime rates for the Engineer are:

\$85 per hour for RPR

\$130 per hour for Construction Representative

1.06 INTERFACE WITH EXISTING FACILITIES

- A. Work shall be accomplished in a manner that minimizes interference with the operation of the treatment plant while it is in service.
- B. All operational functions in the existing treatment plant shall be performed by Owner **personnel**, or their designated representatives, unless otherwise authorized.
- C. Connections to existing pipes and structures shall be scheduled and coordinated in advance with the Owner and the Engineer. It may be necessary to make connections during the night hours or weekends. No claim for extra compensation or extension of contract time will be allowed on account of the necessity for connections to be made during normal "off" hours. Permission of the Owner shall be obtained by the Contractor prior to making any connections to the existing system.
- D. When the Contractor desires certain existing electrical and/or mechanical functions to be interfaced, he shall inform the Owner and Engineer, in writing, a minimum of five (5) working days prior to the date he desires those interfaces to be made. The Contractor shall not alter the settings of or connect or disconnect any existing electrical or mechanical equipment without the approval of the Owner.

1.07 CONTRACTOR'S SEQUENCE OF CONSTRUCTION

- A. The Contractor is responsible for all construction sequencing. The Contractor shall, in accordance with Section 01300 – SUBMITTALS, submit and obtain approval of his construction schedule. A fully detailed and comprehensive CPM schedule with critical path items so noted shall be submitted within 14 days of the notice to proceed and found acceptable to the Owner and Engineer. Approval of updated monthly CPM schedules will be a pre-condition for approval of payment applications. Acceptance of this plan by the Engineer or the Owner denotes only lack of objection at the time and in no way implies that the Engineer or the Owner guarantees that particular sequence of construction as proposed by the Contractor will in fact work.
- B. As construction proceeds, should the Contractor's sequence of construction cause operational problems that were unforeseen at the time of approval, the Engineer or the Owner reserves the right to withdraw the previous approval and require the Contractor to submit and obtain approval of an amended sequence of construction. The sequence of construction will be updated monthly.

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DIVISION 00 - BIDDING AND CONTRACT REQUIREMENTS

SECTION 00920

MDE CONSTRUCTION PERMIT

- Construction Permit

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WATER AND/OR SEWERAGE CONSTRUCTION PERMIT

Permit No.: 23-25-1057
Permit Fee: N/A

Date Issued: 1/17/2024
Expiration Date: 1/17/2027

This permit authorizes Worcester County Commissioners to construct wastewater treatment plant upgrades together with all appurtenances, at the site of 11401 Grays Corner, Worcester County, in accordance with an application dated 4/28/2023 and received by the Maryland Department of the Environment on 5/18/2023 titled in part:

**RIDDLE FARM WASTEWATER TREATMENT PLANT EQUIPMENT UPGRADES
DRAWING SHEET NOS. G-1, C-1 THRU C-4, Q-1.0, Q-1.1, Q-2.0 THRU Q-2.8,
Q-3.0, Q-3.1, S1.1, S2.1, E-1 THRU E-9
AND SPECIFICATIONS**

THIS PERMIT IS ISSUED SUBJECT TO THE ATTACHED FOLLOWING CONDITIONS:

Note: This permit may be suspended or revoked upon a final, unreviewable determination that the permittee lacks, or is in violation of federal, state or local approval necessary to conduct the activity authorized by this permit.

Walid Saffouri, P.E., Program Administrator
Engineering & Capital Projects Program


GENERAL CONDITIONS FOR WATER OR SEWERAGE CONSTRUCTION PERMIT

- The structural adequacy and expected performance characteristics of the various components are not certified by this permit.
- This permit is not transferable.
- A copy of this permit must be posted at the work site during construction.
- This permit will expire, if not specifically extended, unless the construction authorized under this permit has been initiated. The permit will then remain valid for the remainder of construction for a period of up to five years from the start of construction.
- If any provision of this permit shall be held invalid for any reason, the remaining provisions shall remain in full force and effect, and such invalid provision shall be considered severed and deleted from this permit.
- Persons violating the requirements of this permit are subject to penalties of up to \$1000 per day as set forth in Environment Article 9-268 and 9-334 through 9-342, Annotated Code of Maryland.
- A copy of the plans and specifications, authorized for use under this permit, shall be made available at the work site during construction of this project. A revised construction permit in accordance with COMAR 26.03.12 is required prior to making substantive changes or material alteration to the construction authorized under this permit.
- The owner shall secure all Federal, State or local permits, including approval of Sedimentation and Erosion Control Plans that may be required before starting the construction of the project.
- The owner shall insure that this project is inspected during the progress of construction to assure substantial compliance with the approved plans and specifications. A log and construction records shall be maintained by the inspector and may be requested for review at any time by this office.
- The project engineer of the Maryland Department of the Environment (the 'Department') shall be notified prior to the start of construction.
- Inspectors of the Department shall be afforded access to the project site, at reasonable times and upon presentation of credentials:
 - a. to inspect construction authorized under this permit and to determine compliance with applicable regulations;
 - b. to have access to and copy any records required to be kept by this permit and by applicable regulations; and
 - c. to obtain any photographic documentation or evidence.
- Within 60 days after completion of construction, a copy of as-built drawings and the attached construction completion certificate (page 3 of this permit) shall be submitted to the Department. Where construction was completed in accordance with the original plans approved under this permit, the submittal of as-built drawings will not be required.
- The owner shall maintain a permanent record of the as-built drawings, or the original plans if as-built drawings are not required.

GENERAL CONDITIONS (CONTINUED)

- Pursuant to Labor & Employment Article 9-201, the owner shall ensure that the contractor and subcontractors involved in the construction of this project must carry workers' compensation insurance for their employees. If the owner determines to perform the project construction by his/her labor force, the owner shall provide the same. If the entity, undertaking the project construction, is not covered by a workers' compensation policy, a Certificate of Compliance shall be submitted and approved by the Workers' Compensation Commission before initiation of the construction.
- Approval must be obtained from the Department before this project may be placed into service. Any exception allowing partial use of this project shall have the prior written approval of the Department. Approval may be obtained pursuant to the following procedure:
 - a. Where large political subdivisions, commissions, authorities etc. have their own inspection capabilities (satisfactory to the Department), the attached construction completion certificate shall be completed by the director of Public Works or similar responsible person and submitted to the Department.
 - b. Where an acceptable local construction inspection program does not exist, the attached construction completion certification shall be completed by a Professional Engineer licensed to practice in the State of Maryland (preferably the same engineer whose seal and signature appear on the plans approved under this permit) and submitted to the Department.
 - c. Upon receipt of the signed certificate, the Department shall, within (30) working days of the receipt, 1) issue an approval, 2) require further review and on-site inspection or 3) reject the construction certification. Approval shall be automatic for projects that have not received some form of written notification from the Department within (30) working days of receipt of the signed certificate.

23-25-1057
Permit Number


Brandon Choi
Project Engineer
Engineering & Capital Projects Program

WATER AND SEWER CONSTRUCTION COMPLETION CERTIFICATION

The undersigned certifies that the construction authorized by this permit has been completed and inspected and that it substantially meets the terms of Environment Article 9-204, Annotated Code of Maryland.

<hr/> Signature	<hr/> Title	<hr/> Date
------------------------	--------------------	-------------------

The above project has been accepted by the Department within the terms of Environment Article 9-204, Annotated Code of Maryland.

<hr/> Authorized Official	<hr/> Date
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Complete this certificate and return to:
Maryland Department of the Environment
Engineering & Capital Projects Program (ECPP)
Office of Budget and Infrastructure Financing
1800 Washington Boulevard
Baltimore, MD 21230

06/2022



NOTICE

Prior to starting construction, please notify Brandon Choi, Project Engineer, by email at brandon.choi@maryland.gov. Upon completion of the project, the construction must be certified with the signed permit returned to this office along with a set of as-built drawings.

Should you have any questions concerning the permit or its conditions, please contact me at (410) 537-3757 or at walid.saffouri@maryland.gov.

Sincerely,

A handwritten signature in black ink that reads "Walid Saffouri". The signature is written in a cursive style with a long horizontal stroke at the end.

**Walid Saffouri, Program Administrator
Engineering and Capital Projects Program
Office of Budget and Infrastructure Financing**

DIVISION 00 – BIDDING AND CONTRACT REQUIREMENTS
SECTION 00941 - CHANGE ORDER NO.: [Number of Change Order]

Owner: **Worcester County** Owner's Project No.:
 Engineer: **George, Miles & Buhr, LLC** Engineer's Project No.: **220047**
 Contractor's Project
 Contractor: No.:
 Project: **Riddle Farm WWTP Equipment Upgrades**
 Contract Name: **Riddle Farm WWTP Equipment Upgrades**
 Date Issued: Effective Date of Change Order:

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

Description:

[Description of the change]

Attachments:

[List documents related to the change]

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

Recommended by Engineer (if required)

Accepted by Contractor

By: _____

Title: _____

Date: _____

Authorized by Owner

Approved by Funding Agency (if applicable)

By: _____

Title: _____

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DIVISION 01 – GENERAL REQUIREMENTS

SECTION 01100

SUMMARY OF WORK

PART 1 – GENERAL

1.01 DESCRIPTION OF WORK

A. The existing Riddle Farm wastewater treatment plant (WWTP) will be undergoing equipment replacements and upgrades to improve operations, performance and its capability to treat higher average daily flows.

B. The work under this Contract consists of constructing, complete with all equipment, controls/instrumentation, and accessories, the following:

1. Install six (6) new ZENON membrane cassettes pre-purchased by Owner to replace existing membrane units. Includes replacing hoist and crane and appurtenances to accommodate the larger cassette dimensions.
2. Updating the existing associated Membrane PLC controls and SCADA alarms.
3. Furnish and install new Internal Recycle Pumps with variable speed drives and all appurtenances, piping, valves, and meters. Furnish and install new mono-beam crane and hoist assembly for the Internal Recycle Pumps
4. Furnish and install new blower for aeration for the membrane cleaning dip tank and all appurtenances, piping and valves.
5. Furnish and install variable speed drives for the existing Process Blowers
6. Furnish and install new aeration diffusers and piping, valves and appurtenances to replace existing diffuser panels in the Aeration Chambers.
7. Furnish and install a waste backwash Pump Station and Reclaimed Water Settling Tank at the Water Treatment Plant including all piping and appurtenances.
8. Associated electrical and control work.
9. Associated yard piping and site work.

C. The work under this Contract includes all requirements to provide a fully finished and operable wastewater treatment plant including miscellaneous items and incidentals as shall be indicated, shown, specified or required to complete the work in strict conformity with the Contract Documents. The Contractor shall provide all labor, equipment, tools, appliances, materials and incidentals, and shall perform all operations required to completely finish all of the work to the satisfaction of the Owner and the

Engineer. The Contractor shall be obligated to furnish a complete and functioning facility.

D. The existing Riddle Farm WWTP treats sewage from the Glen Riddle subdivision community and adjacent areas. The work under this Contract constitutes a major renovation of this treatment facility; **however, the Contractor's attention is directed to the fact that wastewater service at the Riddle Farm Ewell WWTP must be maintained throughout the construction period and only interrupted temporarily. At no time can wastewater service be cut off without the prior written approval of the Worcester County Water-Wastewater Department. Any interruption to service must be kept to the shortest duration possible and with the approval of the Department.**

1.02 TIME OF COMPLETION OF CONTRACT AND LIQUIDATED DAMAGES

A. The Bid Form states the number of consecutive calendar days allowed from date of "Notice To Proceed" to date of substantial completion and final payment of work under this contract. Because of the urgent requirement for completion, these dates must be met. For each and every day that the Contractor is in default in completing the Contract as defined in the General Conditions and in the Bid, he shall pay to the Owner liquidated damages as outlined in the Agreement.

1.03 CONTRACT DOCUMENTS

A. All work shall be completed in accordance with the Contract Documents.

B. The Contract Drawings and Specifications are complementary. However, should a dispute arise as to which shall govern, the Contract Specifications will apply.

C. Any discrepancy between the "General Conditions" and the "Technical Specifications," the Technical Specifications shall govern.

1.04 WAGE RATES

A. The Contractor shall comply, within the lump sum price bid and without extra cost to the Owner, with Davis-Bacon Prevailing Wage Rates and Regulations which are applicable to this project.

B. Wage rate determinations are appended hereinbefore or will be issued by addendum at least five (5) days prior to bid date.

1.05 FIELD CONTROL OF THE WORK/SURVEYS

A. The Contractor shall engage an independent licensed surveyor qualified in the various types of survey work specified herein. The surveying firm shall have a trained staff large enough to perform the specified duties. Within fifteen (15) days after the

award of the Contract, the Contractor shall submit the name of his licensed surveyor including his qualifications. The surveyor's duties shall be as outlined herein:

1. Survey, set, and maintain guide stakes required for earth movement and levels. The Contract Drawings indicate a benchmark. The Contractor shall use this benchmark in the execution of the work.
2. Establish the locations and level of all structures. Establish the limit of disturbed area.
3. Check grades, contours, and levels throughout earth movement operation, making allowances for required depressions under paving and sodded areas.
4. Establish lines and grades for underground lines. Make interim checks as required to adhere to the Contract Drawings.
5. Provide a certification in writing to the Engineer as to the correctness of the grades, existing building elevations where sewer lines enter paving and utility locations. Indicate in the certification deviations (if any) from the Contract Drawings.
6. Provide As-Built Drawings of all water, sewer, and process lines outside the buildings. Show locations and invert elevations.
7. Inform the Engineer immediately if, during the survey, deviations from the Contract Drawings are uncovered.

PART 2 – PRODUCTS

(Not used)

PART 3 – EXECUTION

3.01 GENERAL REQUIREMENTS

- A. Contractor shall be solely responsible for the means, manpower, methods, techniques, sequences, and procedures of construction.
- B. Construction work under this contract shall be performed in a manner that minimizes impact to normal facility operations.
- C. Discharge permit levels must not be violated because of the Contractor's construction activities.
- D. All operations of existing equipment, valves and gates required to perform the work shall be done by the owner. The Owner or his designated agent shall be informed in writing at least 24 hours, or longer where specified, in advance of the need to operate existing equipment, valves or gates or other actions which could affect facility operations.

E. To achieve reliable, continuous facility operation, all new facilities shall be tested and in operating condition before final tie-ins are made which connect new facilities to existing facilities.

F. The Contractor shall submit to the Engineer drawings showing details of all temporary connections or facilities as required.

G. A minimum of seven (7) calendar days written notice is required from Contractor to Owner for any work requiring changes in operating procedures or removal of equipment, tanks, facilities, or roadways from service.

H. The Owner will be responsible for taking existing facilities off-line; however, the Contractor will be responsible for draining and cleaning (including removal of solids) of these tanks to the degree necessary to perform the work necessary.

I. The Contractor's operations shall not disrupt the collection and removal of sewage sludge from the site and the delivery of equipment, supplies, and chemicals to the site.

J. Contractor shall provide bypass pumping systems and/or bypass piping (where gravity flow is possible) to isolate existing facilities, piping, or equipment where necessary to perform new work. Bypass pumping system requirements are specified in Section 01520.

K. Contractor shall provide temporary membrane filtration system to maintain treatment capacity of the facility while portions of the facility are isolated to perform new work. Temporary membrane filtration system requirements are specified in Section 01520

L. Contractor shall provide temporary power, instrumentation, controls, and alarms necessary to assure continued plant operation during the alterations of existing plant components or installation of new equipment.

M. Contractor shall furnish any temporary access required, including ladders, platforms, grating, and walkways, which shall comply with OSHA laws, for necessary plant operations.

N. No extra payment shall be made for any labor, materials, tools, equipment or temporary facilities required during the construction of facilities. All costs therefore shall be considered to have been included in the price bid of the Proposal.

O. Special Requirements:

1. Existing Treatment Plant

a. The existing treatment plant shall remain in service and partially

operable (at least 1 of 2 trains) while equipment replacements and new upgrades are constructed, tested, made fully operable, and placed into service. During these time, Contractor provided temporary membrane filtration system shall be operable, refer to Section 01540 for specifics.

- b. Construction will require the closing of various valves to isolate tanks and equipment. The Worcester County Water-Wastewater Department does not guarantee that the valves or gates will be completely watertight. It is the Contractor's responsibility to take whatever measures are necessary to proceed with construction if valves leak.
- c. It is suggested that Contractor sequence and schedule construction in close coordination with plant operators.

*** END OF SECTION ***

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DIVISION 01 – GENERAL REQUIREMENTS

SECTION 01200

MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.01 DESCRIPTION

A. Payment for materials furnished and work done under this contract will be made as hereinafter stipulated, for the actual amount of materials supplied and work done under authorization of the Engineer and in accordance with the unit prices bid in the proposal form; and the Contractor shall not be entitled to receive additional compensation for anything furnished or done, except for such extra work as shall be required by written order.

B. It is intended that all work shown on the Contract Drawings and included in the specifications is to be paid for under the items listed in the proposal form. The absence from the proposal form of bid items for any specific category of work shall be interpreted as meaning that the cost of such work, accomplished as defined by the Contract Documents, shall be included in the prices bid for related items listed in the proposal form. Should the Contractor feel that the cost for any item of work has not been defined by a Bid Form payment item, he shall include the cost for that work in some other applicable bid item, so that his proposal for the project reflects his total price for completing the work in its entirety.

C. The prices stated in the proposal(s) include all costs and expenses for taxes, labor, equipment, materials, commissions, transportation charges and expenses, patent fees and royalties, labor for handling materials during inspection, together with any and all other costs and expenses for performing and completing the work as shown on the Drawings and specified herein. The basis of payment for an item at the lump sum or unit price shown in the proposal(s) shall be in accordance with the description of that item in this Section.

D. All items in the Bid which are designated as “Contingent Bid Items” are to be used and will be paid for only at the written direction and authorization of the Engineer, if agreed to by the Owner. Payment under this section will be made for materials furnished and placed in addition to those shown or beyond the limits indicated or reasonably inferred from the Contract Documents. All materials furnished and installed shall be in accordance with these specifications. Measurements and payment will be in accordance with the proposal and will include but not necessarily be limited to the furnishing, hauling, placing, and installing of materials, and the furnishing of such manpower and equipment as required to accomplish the work as directed in writing by the Engineer.

E. All excavation under this Contract is unclassified; that is, the unit prices bid shall be taken to include and cover all materials required to be excavated and backfilled, whether wet or dry, and regardless of the character of the materials. The excavations, removal and replacement of road surfacing materials, curb, sidewalk, gutter and yard restoration, as required, shall be included in the unit prices bid with any exceptions as noted herein or as designated on the plans.

F. The cost of dewatering and associated work will not be separately paid for but shall be considered as incidental to other bid items and included in the prices bid for them.

G. All removal, relocation and disposal work as indicated in the Contract Documents, and/or as necessary to complete the proposed work shall be performed at no additional cost to the Owner. Cost of all removal, relocation and disposal work shall be included in the price bid.

H. For the unit price Items included in the Bid, the Contractor will be paid for the actual quantity of the authorized work done or material furnished under each item of the proposal, at the unit price bid for such item. The quantities for payment under this Contract shall be determined by actual measurement of the completed items, in place, ready for service and accepted by the Owner, in accordance with the General Conditions.

I. All items of work shall be measured concurrently, upon installation and before covering or backfilling, by the Resident Project Representative and the Contractor's representative. All items so measured will be recorded by both parties in a format which can be kept current until completion of work. All measurements, to the maximum extent possible, shall be referenced to base dimensions and stationing shown on the Drawings.

J. Payments during the course of the work for lump sum items will be made on the basis of percentage completion of the work items listed in the Schedule of Values for each lump sum item. The Schedule of Values shall be prepared by the Contractor and submitted to the Engineer and shall serve as a breakdown of the Lump Sum bid for the purpose of arriving at a basis for the monthly estimate. The Schedule shall add up to 100% of the Lump Sum bid.

1.02 LUMP SUM BID ITEMS

A. Bid Item A1: Mobilization / General Conditions

1. Payment for mobilization and general conditions associated with the work shown under this Construction Contract shall be made at the lump sum price bid for Bid Item A1. The value of this lump sum bid item shall not exceed 5% of the value of Bid Item A3. At the onset of construction, fifty

percent (50%) of the Bid Item amount can be requested for payment and the remaining 50% will be paid on a pro-rated basis for the remainder of the construction contract duration.

B. Bid Item A2: Lump Sum Bid – Demolition and Disposal

1. Payment for all demolition and disposal work shall be made at the lump sum price bid for Bid Item A2.
2. The lump sum prices bid shall include all demolition and disposal work associated with the existing Riddle Farm WWTP and WTP.

C. Bid Item A3: Lump Sum Bid - WWTP Work

1. Payment for constructing the improvements to the Ewell WWTP shall be made at the lump sum price bid for Bid Item A3.
2. The lump sum prices bid for constructing the improvements to the Riddle Farm WWTP shall include, but not be limited to, all work related to furnishing and installing all equipment and appurtenances complete with backwash waste pump station, reclaimed water settling tank, replacement membranes, internal recycle pumps, aeration blower, process blower variable speed drives, aeration diffusers, hoists and cranes, flow meters, PLC controls and SCADA alarms, electrical conduits, site restoration work, dewatering, sediment and erosion control, all other appurtenances on the site specified or detailed. Lump sum price bid shall include all incidental minor and miscellaneous items, work and materials for which no specific lump sum or unit price bid item is shown, and which are necessary to complete the work and to maintain and/or repair the work.
3. Lump Sum Bid shall include the furnishing of all labor, tools and services associated with Contractor's installation of Equipment Supply Contract and Assignment provided by "VEOLIA-ZENON.

1.03 CONTINGENT BID ITEMS

A. Bid Item B1: Furnish and Place Miscellaneous Concrete

1. The price bid shall include and cover furnishing and placing miscellaneous 3,000 psi concrete, including forming, finishing, and all other incidental work or other construction not included as part of other pay items.
2. Measurement of quantities for miscellaneous concrete will be made based upon authorized depth, width, and length of concrete placement.
3. Sackrete, or similar product, will be allowed in miscellaneous concrete.
4. Payment for all work in connection with miscellaneous concrete will be made at the appropriate unit prices bid for the volume of concrete actually furnished and placed within the limits defined here in before and as authorized by the Engineer.

B. Bid Item B2: Furnish and Place Gravel Bedding

1. The price bid for furnishing and placing additional gravel bedding shall include and cover furnishing, placing and compacting and shaping gravel in excavations and all other incidental work not specifically detailed on the Contract Drawings or Specifications. Only additional gravel bedding ordered by the Engineer will be paid for under this item.
2. Measurement for quantities of additional gravel bedding will be based upon the authorized depth and width of placement, as directed by the Engineer.
3. The Contractor shall not be paid for gravel bedding used for dewatering in addition to bedding requirements shown on plans.
4. Gravel bedding specifically called out for on the plans and specifications under pipelines and structures will not be paid for under "Furnish and Place Gravel Bedding," but will be incidental to other bid items.
5. Payment for all work in connection with additional gravel bedding will be made at the appropriate unit price bid for the volume actually furnished and placed within the limits defined here in before and as authorized by the Engineer in writing prior to the work being performed.

C. Bid Item B3: Furnish and Place Special Backfill

1. The price bid for furnishing and placing special backfill shall include and cover furnishing, placing and compacting special backfill and other incidental work not specifically detailed on the Contract Drawings or Specifications. Only additional special backfill as ordered by the Engineer will be paid for under this item.
2. Measurement for quantities of special backfill will be placed upon the authorized depth and width of placement.
3. Payment for all work in connection with special backfill will be made at the appropriate unit price bid for the volume actually furnished and placed within the limits defined here in before and as authorized in writing by the Engineer prior to the work being performed.

1.04 PAYMENT

A. Payment for Material not incorporated in the Work

1. Storage of Material
 - a. Payment for equipment and materials stored on the site and not actually incorporated in the work will be made on the basis of 95 percent of the amount of paid invoices submitted to the Engineer for incorporation in the monthly estimate.
2. Authorization for Payment

- a. Payment will be authorized after delivery to the Construction site or other approved, owner accessible location within Somerset County, Maryland and after being certified by the Engineer as being stored in conformance with the manufacturers recommendations and satisfactory evidence is provided that the items are as specified.
- b. Title to all items of equipment and materials upon which payment has been made shall rest with the Owner and document transferring title shall be executed by the Contractor. Transfer of ownership shall not relieve the Contractor of continuing insurance coverage and of protecting stored items against damage, deterioration or loss of any kind.
- c. Should material or equipment become damaged or stored improperly and contrary to manufacturers recommendations, being therefore subject to later damage, then the Engineer will reduce the next following monthly payments by an amount sufficient to repair or replace such units.
- d. To initiate a request for partial payment the Contractor shall submit his request in writing to the Engineer with all necessary evidence.

B. Payments Withheld

1. The Owner may decline to pay all or any part thereof or, because of subsequent observations, it may nullify the whole or any part of any payment previously issued, to such extent as may be necessary in its opinion to protect the Owner from loss because of:
 - a. Defective work not remedied.
 - b. Third party claims filed or reasonable evidence indicating probable filing of such claims.
 - c. Failure of the Contractor to make payments properly to subcontractors or for labor, material or equipment.
 - d. Reasonable evidence that the work cannot be completed for unpaid balance of the Contract Sum.
 - e. Damage to the Owner or another Contractor.
 - f. Reasonable evidence that the work will not be or has not been completed within the Contract time.
 - g. Failure to carry out the work in accordance with the Project Manual.
 - h. Cancellation, material change or lapse of required insurance as specified in the Project Manual.

PART 2 - NOT USED

PART 3 - NOT USED

*** END OF SECTION ***

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DIVISION 01 – GENERAL REQUIREMENTS

SECTION 01300

SUBMITTALS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Shop Drawings, Product Data and Samples
- B. Operation And Maintenance Manuals
- C. Electronic O&M Data
- D. Construction Schedule
- E. Breakdown Of Lump Sum Prices (Schedule of Values)
- F. Record Drawings
- G. Submission Of Manufacturer's Certificates
- H. Warranty Submittals Requirements
- I. Operating Instructions
- J. Progress Photographs

1.02 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

A. Shop drawings are generally defined as all fabrication and erection drawings, diagrams, brochures, schedules, bills or material and other data prepared by the Contractor, his subcontractors, suppliers or manufacturers which illustrate the manufacturer, fabrication, construction and installation of the work, or a portion thereof.

B. All costs necessary for compliance with the requirements of this Section of the Specifications shall be included under the lump sum price bid.

C. Detailed shop drawings, data, literature for fabricated materials or equipment to be incorporated in the work shall be submitted to the Engineer for review for general compliance with the Project Manual before fabrication. The Contractor shall obtain and check manufacturer's shop drawings, certified prints and other pertinent data for conformance with all requirements of the Plans and Specification and in ample time to permit satisfactory progress of the work. After the completion of such checking and verification by the Contractor, the Contractor shall sign or stamp such drawing, which stamp shall state as follows:

Specification Section _____

Checked by _____
(Contractor's Name)

Signed by _____
(Checker's Name)

D. All data, drawings and correspondence from subcontractors, manufacturers or suppliers shall be routed through the Contractor. The Engineer shall review only such data and details as are transmitted to him by the Contractor. All correspondence from the Contractor to the Engineer shall refer to the appropriate section of these specifications containing the subject matter of the inquiry.

E. All shop drawings shall be in conformity with all requirements of the plans and specifications. All shop drawings, except diagrams, brochures, schedules and illustrations shall be to an appropriate scale, no smaller than 1/8 inch = 1 foot 0 inches and shall give all dimensions necessary for installation and incorporation in the work. All shop drawings shall be accurate and complete, showing outline and section views, details, materials, accessories, appurtenances and related items. Shop drawings showing piping and conduit systems shall incorporate sufficient views to show all fittings and specialties including locations and spacing of hangers and supports. Piping and/or conduit systems 3 inches in diameter and smaller may be shown as single line. Equipment and specialties installed within and/or connected to piping and conduit systems shall be cross-referenced to equipment and specialty shop drawings by shop drawing identification number, manufacturer name, catalog or model number, and equipment numbers shown on the plans. Electrical shop drawings shall include, but are not necessarily limited to, complete terminal identification diagrams and schedule, complete point-to-point interconnection diagram, complete single line and elementary wiring diagrams for all power, signal, control and lighting systems, together with panel layout drawings. Terminal point and wire identification on all working drawings shall be identical to related terminal point and wire identifications on equipment and panels, and absolutely no deviation from this requirement will be permitted.

F. The Contractor shall submit to the Engineer a minimum of twelve (12) copies of shop drawings and approval data plus any additional number required for the Contractor's use. The Engineer will retain eight (8) copies of each submittal and return four (4) copies to the Contractor. The Engineer's notation of the action taken will be noted on all of the returned copies. At the time of each submission, the Contractor shall call to the Engineer's attention, **in writing**, any deviations that the shop drawings may have from the requirements of the Plans and Specifications.

G. Upon review by the Engineer of the above drawings, lists, samples and other data the same shall become a part of the Contract, and the fabrications furnished shall be in conformity with the same, provided that the review of the above drawings, lists, specifications sample or other data shall in no way release the Contractor from his responsibility for the proper fulfillment, by any fabrication, or the requirements of this Contract.

H. Corrections or comments made on the shop drawings during the Engineer's review do not relieve the Contractor from compliance with the requirements of the drawings and specifications. This check is only for review of general conformance with the design concept of the project and general compliance with the information given in the Project Manual. The Contractor is responsible for confirming and correlating all

quantities and dimensions, selecting fabrication processes and techniques of construction, and in performing his work in a safe manner. If the shop drawings deviate from the Project Manual, the Contractor shall advise the Engineer of the deviations, in writing accompanying the shop drawing, including the reasons for the deviations, and shall request deviation from the Project Manual.

I. The Contractor's attention is specifically directed to the fact that no work shall be fabricated, nor equipment or materials ordered, nor any construction performed, prior to approval by the Engineer of shop drawings applicable thereto. Construction performed in violation of this requirement will be neither approved nor certified for payment until applicable shop drawings have been submitted and approved. If the Engineer so directs, the Contractor shall disassemble and remove any such construction performed prior to approval by the Engineer of shop drawings applicable thereto, and the Contractor will be allowed no additional compensation nor extension of contract time. If any equipment or materials are ordered by the Contractor prior to submission and approval of shop drawings he does so at his own risk.

J. It shall be the responsibility of the Contractor to make all the necessary changes in other items, which result from deviations or changes requested by the Contractor and approved by the Engineer, so that all items perform the requirements and intent of the Project Manual.

K. The shop drawings are intended to be utilized by the Contractor for additional fabrication, assembly and erection data. The shop drawings do not change or supersede the Plans and Specifications except in specific cases when the Contractor requests in writing and receives approval in writing for a deviation from the Plans and Specifications. The Contractor's request for a change shall give, in detail, the specific change requested and shall state the reason for the change. Changes requested by the Contractor and approved by the Engineer shall not be construed to include approval of any change except the changed details specifically requested and approved.

L. The Contractor will also submit to the Engineer for review, with such promptness as to cause no delay in work, all samples required by the Project Manual. All samples shall have been checked by and stamped with the approval of the Contractor, identified clearly as to material, manufacturer, any pertinent catalog numbers, and the use for which intended.

M. After review by the Engineer, shop drawings shall be returned to the Contractor marked as follows: APPROVED, APPROVED AS NOTED, REVISE AND RESUBMIT, or REJECTED. Unapproved shop drawings (i.e., REVISE AND RESUBMIT or REJECTED) shall be returned to the Contractor for necessary modifications; only two (2) copies of unapproved shop drawings will be returned. Subsequently, the Contractor shall submit a minimum of ten (10) copies of complete, revised shop drawings to the Engineer for approval.

N. The turnaround time by the Engineer on shop drawings will be: 14 days from date of receipt for shop drawings pertaining to Divisions 1 through 14 and 21 days from date of receipt for Divisions 15 and 16 (Mechanical & Electrical items).

O. Within fourteen (14) days of the Preconstruction Conference, the Contractor shall submit a list of all shop drawings to be submitted. This list can then be used as a check to ensure that all items are submitted.

1.03 OPERATION AND MAINTENANCE MANUALS

A. The Contractor shall furnish the Engineer four (4) copies of a complete instruction manual for installation, operation, maintenance and lubrication of each component of mechanical and electrical equipment. The operation and maintenance manual shall be submitted at least ninety (90) days prior to the anticipated completion of the project.

B. Manuals shall include operating and maintenance information on all systems and items of equipment. The data shall consist of catalogs, brochures, bulletins, charts, schedules, equipment numbers, wiring diagrams and assembly drawings which shall describe location, operation, maintenance, lubrication, operating weight, lubrication charts showing manufacturer recommended lubricants for each rotating or reciprocating unit and other necessary information for the Owner to establish a complete maintenance program.

1. Manuals shall include a complete and detailed listing describing routine maintenance for each time interval: daily, weekly, monthly, quarterly, semi-annually and yearly. Routine maintenance shall include lubrication, adjustments, inspections, calibrations, etc., and a list of acceptable equivalent lubricants from at least three (3) different major manufacturers whose products are locally available. A manufacturer and/or vendor responsible such as "see instruction manual" will not be acceptable.

C. The following items shall also be submitted:

1. Two (2) prints of one (1) 8x10 color photograph of each major piece of equipment.
2. Name of manufacturer with address and phone number for service and parts.
3. Name, address and phone number of the nearest service representative for the manufacturer.
4. Complete "nameplate" data including serial number for each piece of equipment.
5. A list of spare parts including part number and other information needed to order parts.
6. Weight of individual components of each piece of equipment weighing over 100 pounds.
7. Complete electrical wiring diagrams.

D. Where an O&M manual includes information on equipment not supplied or installed, the extraneous information shall be marked out to avoid confusion.

E. Where an O&M manual contains a written warranty or guarantee, it shall be certified to meet the minimum length of time and requirements defined in the Project Manual.

1.04 ELECTRONIC O&M DATA

A. In addition to the printed operations and maintenance materials specified above, the Contractor shall furnish all specified operations and maintenance materials in electronic format prior to Substantial Completion. Electronic equipment manual files shall be submitted in Adobe Acrobat Reader (.PDF) format.

B. Electronic files shall be submitted on one or more compact disks (650 MB CD). Two sets of compact disks shall be provided, one for Owner and one for Engineer. CDs and covers shall be labeled with the project name, supplier, equipment identification and specification section. CDs shall be provided in individual hard plastic cases.

C. In addition to the complete manual submitted in PDF format, the supplier shall furnish electronic files containing the following information in Microsoft Word (.doc).

1. Operation Description – Discuss operational procedures for the equipment supplied. Operational procedures shall include “startup procedures,” “normal operation,” “automated operation,” and “shutdown procedures.” Where multiple modes of automatic operation exist, describe each mode separately.
2. Controls – Provide a table outlining the controls provided for the unit. Utilize two columns in the table. The left-hand column shall indicate the location of the control (e.g., local to the pump, remote control panel, etc.). In the right-hand column describe the control and its function.
3. Troubleshooting – Provide a troubleshooting table with three columns entitled “Problem,” “Possible Causes,” and “Corrective Action.” Under the “Problem” column, identify possible problems that may occur with the equipment or system including but not limited to, all malfunctions that can be expected for the equipment and all alarm indications provided by the system. Under the “Possible Causes” column, identify the causes that may be the root of each “problem.” Under the “Corrective Action” column, provide direction to verify and rectify / repair the “Problem.”
4. Preventive Maintenance – Provide a preventive maintenance table containing headings for “Daily,” “Weekly,” “Monthly,” and “Annual” (or other period as required) maintenance requirements. Under each heading, indicate visual inspections, procedural inspections, calibration routines, lubrication, and all other manufacturer-suggested preventive maintenance procedures required for the equipment or system. List recommended

lubricants and any special tools required for the recommended maintenance.

5. Nameplate Data – Provide nameplate data tables consisting of two columns. In the left-hand column, indicate the equipment name, equipment designation, manufacturer, model number, serial number, year installed, dimensions, min and max speed, min and max torque, measurement range, accuracy, and all other data that may assist maintenance persons in identifying, replacing, and maintaining the piece of equipment. Provide the appropriate values and designations in the right-hand column. Provide a separate nameplate data table for each major system component, including gear reducers, motors, etc. Motor nameplate data tables shall include as a minimum, manufacturer, model, serial number, enclosure type, voltage, speed, service factor, frame size, NEMA design, and insulation class.
6. Manufacturer and Sales Representative Information – Indicate the equipment manufacturer name, mailing address, telephone number, fax number, email address, website address, and contact person's name. Provide the same information for the local manufacturer's representative who supplied the equipment.

D. PLC and HMI data files to be provided on CD in their native format and PDF report format where applicable. These CDs are to be provided with O&M and updated when any program change is made during warranty period.

1.05 CONSTRUCTION SCHEDULE

A. The Contractor shall submit, for approval, a CPM construction schedule plotting work increments against time, indicating anticipated date of beginning and completion of each work increment and indicating completion of all increments by the scheduled date. The Contractor shall assign such work forces as are necessary to accomplish all increments of the work within the time allotted on the construction schedule.

B. The CPM shall be done in Primavera software (or compatible if acceptable by Owner) and shall show the schedule for completion of each major item broken down into tasks – one for each section of the specifications, e.g. excavation, concrete, HVAC, etc.

C. The Construction Schedule shall be submitted within fourteen (14) days after the Notice to Proceed.

D. The CPM shall be updated monthly to reflect actual progress versus original schedule. This CPM shall be used to document any additional time requested for changes in the scope of work. Time extension requests will only be reviewed if justification is given by the Contractor and shown to affect the critical path.

1.06 BREAKDOWN OF LUMP SUM PRICES (SCHEDULE OF VALUES)

A. Within fourteen (14) days of the Notice to Proceed, the Contractor shall submit, for approval, a breakdown into construction categories of his lump sum bid price for Schedule A1. This breakdown shall add up to the full 100 percent value of his lump sum bid, and all parts of it shall be covered by the Performance Bond. The breakdown shall be used for the purpose of arriving at a basis for monthly estimates. The Mobilization category shall be limited to five (5) percent of the Lump Sum Bid Item.

1.07 RECORD DRAWINGS

A. During the progress of the job, the Contractor shall keep a careful record at the job site of all changes and corrections to the information shown on the Drawings. The Contractor shall enter such changes and corrections on one set of Contract Drawings immediately. The record drawings shall indicate, in addition to all interior changes and corrections, the actual location referenced from two permanently fixed surface structures of all subsurface utilities installed or uncovered by him. At the time of beneficial occupancy of each facility involved under the Contract, the Contractor shall submit to the Engineer one set of record drawings showing the aforementioned data. If the Contractor fails to maintain the record drawings as required herein, final payment, with respect to the Contract as a whole, will be withheld until proper record drawings have been furnished to the Engineer.

B. The Contractor shall keep one copy of all Project Manual and approved Shop Drawings at the site in good order and annotated to show all changes made during the construction process. These shall be available to the Engineer and shall be delivered to him upon completion of the Project.

1.08 SUBMISSION OF MANUFACTURER'S CERTIFICATES

A. General:

1. The Contractor shall submit Manufacturer's Certificates for the installation of those items of major equipment named in the various sections of specifications and in accordance with Section 11040.
2. Such Manufacturer's Certificates shall state that the equipment has been installed under either the continuous or periodic supervision of the manufacturer's authorized representative, that it has been adjusted and initially operated in the presence of the manufacturer's authorized representative and that it is operating in accordance with the specified requirements, to the manufacturer's satisfaction.

B. Manufacturer's Representative:

1. The definition of "manufacturer's representative" shall be as follows: a representative from the manufacturer's plant, familiar with the actual problems of manufacturing, installing and operating the particular

equipment or product and with enough years of experience in this field to determine the successful operation of the equipment or product. Sales representatives or agents of the manufacturers will not be acceptable.

2. As related to his obtaining the manufacturer's certificates, the Contractor shall include in this contract price the cost of furnishing competent and experienced manufacturer's representatives who shall represent the manufacturer on equipment and products furnished and listed under this Contract, to assist the Contractor to install, adjust, start up and test the equipment and products in conformity with the Project Manual. After the equipment and products have been operated through the trial period for each phase of construction and before being put into permanent service by the Owner, such manufacturer's representative shall make all adjustments and tests required to provide that such equipment and products are in proper and satisfactory operating condition, and meet the requirement for issuing the manufacturer's certificate.

1.09 WARRANTY SUBMITTALS REQUIREMENTS

A. For all major pieces of equipment, submit a warranty from the equipment manufacturer. The manufacturer's warranty period shall be concurrent with the Contractor's for a period of one year from Substantial Completion, unless otherwise specified in the individual specification.

B. Copies of all approved equipment warranties shall be included in the final operations and maintenance manual in the appropriate equipment section.

C. All equipment warranties shall be received and approved prior to approval of the final payment application for the project.

1.10 OPERATING INSTRUCTIONS

A. Particular sections of these General Requirements require that the Contractor furnish qualified personnel to instruct Plant personnel in the proper operation and maintenance of equipment and systems provided in this Contract. Such instruction periods shall be in accordance with the requirements of the individual sections of the General Requirements, Section 11040, and with the following paragraphs.

B. When specified in individual sections of these specifications, upon completion of all work and testing for a particular section of the General Requirements, the Contractor shall furnish, at no extra cost to the Owner, the necessary manufacturer's engineers, representatives, technicians, skilled labor and helpers and shall operate all systems and equipment for the specified instruction period. During this period, the manufacturer's representatives shall fully instruct the Engineer and/or his representatives and the Plant personnel in the operation, maintenance, lubrication and adjustment of all systems and equipment.

C. If the Operation and Maintenance Manuals specified herein are not available at the time of the instruction period, the Contractor shall provide the Engineer with one copy of the manufacturer's operation literature for each system or item of equipment. Installation and operating sheets or booklets normally shipped with equipment may be used for this purpose.

D. The Contractor shall schedule the instruction period for a time mutually agreeable with the Engineer and the Owner. A minimum of ten (10) days notice shall be provided.

E. All training may be video taped by the Owner.

1.11 PROGRESS PHOTOGRAPHS

A. The Contractor shall furnish the Owner with photographs; the cost such shall be included in the lump sum bid. Photographs shall be taken before the site has been disturbed and on an average of once a month during construction, and at the completion of the work. They shall be clearly marked to orient the photograph as to the portion of the work and state the date the photograph was taken. A minimum of twelve (12) photographs shall be taken each month and the proofs provided to the Owner, along with a CD-Rom containing the images. The Owner shall then select six (6) photographs each month of which the Contractor shall make three (3) sets of 8" x 10" prints. Contractor shall furnish prints in three photo albums sized to hold all progress photographs, as well as a CD-Rom containing all images.

1.12 LIST OF SUBCONTRACTORS

A. The Contractor shall submit a list of subcontractors for approval with his bid.

PART 2 – PRODUCTS

(Not used)

PART 3 – EXECUTION

(Not used)

*** END OF SECTION ***

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DIVISION 01 – GENERAL REQUIREMENTS

SECTION 01400

QUALITY CONTROL

PART 1 - GENERAL

1.01 CODES, RULES, PERMITS AND FEES

A. General:

1. Local, State and Federal permits secured by the Owner will be included in Special Provisions or will be provided to the prospective Bidders by Addenda. The Contractor shall comply with the provisions of all such permits, and the cost of all work dictated by such permits shall be included in the prices bid.
2. The Contractor shall give all necessary notices, obtain all permits (except those referenced above) and pay all governmental taxes, fees and other costs in connection with the work, file all necessary plans, prepare all documents and obtain all necessary approvals of all governmental departments having jurisdiction, obtain all required Certificates of Inspection and Approval for the work and deliver same to the Engineer, except as otherwise noted herein.

B. Compliance: All materials furnished and all work installed shall comply with the requirements of all governmental departments having jurisdiction.

1.02 STANDARDS

A. Any reference to standards in the Project Manual shall always imply the latest issue in effect including all revisions at the time bids are taken, of said standards unless otherwise stated.

B. Abbreviations for various organizations which may be used in these Specifications are as follows:

<u>Abbreviation</u>	<u>Organization</u>
AASHO	American Association of State Highway Officials
ACI	American Concrete Institute
AFBMA	Anti-Friction Bearing Manufacturers Association
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
ANSI	American National Standards Institute

APA	American Plywood Association
ASME	American Society Mechanical Engineers
ASTM	American Society for Testing and Materials
AWPA	American Wood Preservers Association
AWPB	American Wood Preservers Bureau
AWS	American Welding Society
AWWA	American Water Works Association
CISPI	Cast Iron Soil Pipe Institute
CS	Commercial Standard
FS	Federal Specification
IEEE	Institute of Electrical and Electronics Engineers
MBM	Thousand feed, board measure
NBHA	National Builder's Hardware Association
NBS	National Bureau of Standards
NCMA	National Concrete Masonry Association
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
PCI	Prestressed Concrete Institute
PS	Product Standard of NBS
SPBI	Southern Pine Inspection Bureau
SSPC	Steel Structures Painting Council
UL	Underwriter's Laboratories
WWPA	Western Wood Products Association

1.03 VERIFICATION OF DIMENSIONS

A. The Contractor shall be responsible for field verification of all dimensions of existing facilities and other items which are shown on the Contract Drawings.

B. The Contractor shall be responsible for cross checking dimensions between different drawings as facilities are being laid out. Any discrepancies shall immediately be brought to the attention of the Engineer.

PART 2 – PRODUCTS

(Not used)

PART 3 – EXECUTION

(Not used)

*** END OF SECTION ***

DIVISION 01 – GENERAL REQUIREMENTS

SECTION 01410

TESTING LABORATORY SERVICES

PART 1 – GENERAL

1.01 LABORATORY

A. Contractor shall select, employ and pay for services of an Independent Testing Laboratory to perform specified inspection, sampling and testing where specified in the various sections of the specifications.

1. Contractor shall cooperate with laboratory to facilitate execution of its required services.
2. Employment of laboratory shall in no way relieve Contractor's obligations to perform the Work of the Contract.

1.02 LABORATORY DUTIES

A. Cooperate with Engineer and Contractor; provide qualified personnel after due notice.

B. Perform specified inspections, sampling and testing of materials and methods of construction:

1. Comply with specified standards.
2. Ascertain compliance of materials with requirements of Project Manual.

C. Promptly notify Engineer of observed irregularities or deficiencies of work or products.

D. Promptly submit five (5) copies of written report of each test and inspection to Engineer. Each report shall include:

1. Date issued.
2. Project title and number.
3. Testing laboratory name, address and telephone number.
4. Name and signature of laboratory inspector.
5. Date and time of sampling or inspection.
6. Record of temperature and weather conditions.
7. Date of test.
8. Identification of product and specification section.
9. Location of sample or test in the Project.

10. Type of inspection or test.
11. Results of tests and compliance with Project Manual.
12. Interpretation of test results, when requested by Engineer.

E. Perform additional tests as required by Engineer or the Owner.

1.03 LIMITATIONS OF AUTHORITY OF TESTING LABORATORY

A. Laboratory is not authorized to:

1. Release, revoke, alter or enlarge on requirements of Project Manual.
2. Approve or accept any portion of the Work.

1.04 CONTRACTOR'S RESPONSIBILITIES

A. Cooperate with laboratory personnel, provide access to Work.

B. Furnish incidental labor and facilities:

1. To provide access to Work to be tested and to maintain traffic in order to provide laboratory personnel a safe work site.
2. To obtain and handle samples at Project site or at source of product to be tested.
3. To facilitate inspections and tests.
4. For storage and curing of test samples.

C. Inspection and testing exclusively for the Contractor's convenience shall be the sole responsibility of the Contractor, at no additional cost to the Owner.

PART 2 – PRODUCTS

(Not used)

PART 3 – EXECUTION

(Not used)

*** END OF SECTION ***

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01500

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 - GENERAL

1.01 FIELD OFFICE

A. The Contractor shall provide, within the lump sum price bid and without extra cost to the Owner, a suitable field office on site of the project for the use by the Owner and Engineer and Contractor. The office shall be set up, equipped and made ready for use prior to the beginning of work on the project and shall remain until all field records pertinent to the project have been completed. The Contractor shall, within the lump sum price bid and without extra cost to the Owner, pay all costs of operating and maintaining the field office including but not limited to charges for electric and broadband internet service, sanitary facilities, heating, fuel oil, etc.

B. The field office shall be equipped with one fire extinguisher, one office-type desk and chair, one drafting board, one two-drawer fire resistant file cabinet, twelve (12) chairs, one conference table, one copier/scanner machine capable of interfacing with Engineer provided PC, and one high speed internet connection. The Contractor shall supply two telephone lines. The field office shall be heated during cold weather and have sufficient window area to furnish natural light. The windows shall be constructed to open and close to allow ventilation. The office shall be suitably air conditioned if used during summer months. The office will be provided with neat sanitary toilet accommodations. Minimum office floor space shall be 300 square feet.

C. The Contractor shall maintain the field office in good condition and appearance for the duration of the project.

D. The Contractor will not receive any monies for the field office until it is approved by the Owner.

1.02 ELECTRIC POWER

A. It shall be the obligation and responsibility of the General Contractor to provide and maintain temporary facilities for furnishing light and power necessary for operations under the General Contract and to make all necessary arrangements therefore, including all required connections, ordering the meter, and paying all fees and inspection charges.

B. The General Contractor shall make the temporary power facilities available to any and all approved Subcontractors, for their use in connection with their Contracts, and may charge each Subcontractor for such service an amount not to exceed a fraction of the cost of the project. Removal of temporary facilities shall be by the General Contractor. The installation and meters shall remain until need for same by each Subcontractor has ceased or until completion of the General Contract.

1.03 TEMPORARY HEAT AND VENTILATION

A. It shall be the obligation and responsibility of the General Contractor to provide and maintain temporary heat by means of portable electric, oil or gas-fired units. The General Contractor shall provide and pay for all fuel and electricity used in the temporary facilities and shall provide proper smoke pipes or other means to prevent smoke or smudge from marking up walls, ceilings or other parts of equipment.

B. Should the temporary heating facilities require electric service, the General Contractor shall provide the necessary wiring and power.

C. After their installation and testing, the permanent heating system facilities may be used for temporary heat, it shall be the responsibility of the General Contractor to guarantee the heating system for a period of two years following final acceptance of the General Contract or beneficial occupancy of the General Contract, whichever comes first. It also shall be the responsibility of the General Contractor to replace all filters before the final acceptance of the General Contract.

D. It shall be the responsibility of the General Contractor to repair any damage to heating and ventilating equipment suffered as the result of use by the General Contractor.

1.04 WATER SUPPLY

A. Potable water is available at the existing WTP site.

1.05 SANITARY FACILITIES

A. The Contractor shall provide and maintain approved sanitary facilities for the full term of the Contract.

1.06 CONSTRUCTION SIGN

A. The Contractor shall provide one (1) construction signs (MDE) to be displayed throughout the duration of construction. Sized 4 feet by 8 feet. Engineer to provide format.

B. The Contractor shall be responsible for placing and removing the sign on the job site as directed by the Owner.

1.07 FIELD CONDITIONS AND MEASUREMENTS

- A. The Contractor shall base all measurements, both horizontal and vertical from established benchmarks and monuments. 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, which prevent following good practice or the intent of the Contract Drawings and Specifications, he shall notify the Engineer and shall not proceed with his work until he has received instructions from the Engineer.
- 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 with the aspect of the work.

1.08 PROTECTION OF PERSONS AND PROPERTY

- A. The Contractor shall be responsible for initiating, maintaining and providing supervision of safety precautions and programs in connection with the work including, but not limited to, all legally required precautions and programs.
- B. The Contractor shall take all reasonably necessary precautions for safety of, and shall provide all reasonably necessary protection to prevent damage, injury or loss to: (1) employees on the work and other persons who may be affected thereby; (2) the work, materials and equipment to be incorporated therein; and (3) other property at or adjacent to the site.
- C. The Contractor shall give all notice and comply with all applicable laws, ordinances, rules, regulations, and orders of public authorities bearing on the safety of persons and property and their protection from damage, injury or loss arising from Contractor's operations hereunder.
- D. The Contractor shall be liable for damage or loss (other than damage or loss to property insured under the property insurance provided or required by the Project Manual to be provided by the Owner) to property at the site to the extent caused in whole or in part by the Contractor, a Subcontractor of the Contractor or anyone directly or indirectly employed by either of them, or by anyone for whose acts they may be liable, except damage or loss attributable to the acts or omissions of the Owner, the Owner's separate contractors or anyone directly or indirectly employed by them or by anyone for whose acts they may be liable and not attributable to the fault or negligence of the Contractor.

1.09 CONTRACTOR STORAGE AND WORK AREAS

- A. The Contractor will be responsible for providing storage and work areas for use

by the Contractor for storage of materials, tools, equipment and other items necessary for construction. The Contractor shall be fully responsible for the security of these areas, including fencing, and other means of security. Under no circumstances will the Owner be responsible for the security of any property belonging to the Contractor, his subcontractors, or any of his work forces.

B. Contractor shall maintain all staging areas including grass cutting.

1.10 DRAINAGE

A. The Contractor shall keep all existing surface and subsurface drainage and water courses unobstructed, or provide equal courses effectively placed, and prevent accumulations of surface water.

1.11 SOIL EROSION AND SEDIMENT CONTROL

A. Adequate control of soil erosion and sedimentation of both a temporary and permanent nature on areas disturbed by this work shall be provided at no extra cost to the Owner, subject to the approval of the Engineer.

PART 2 – PRODUCTS

(Not used)

PART 3 – EXECUTION

(Not used)

*** END OF SECTION ***

DIVISION 01 – GENERAL REQUIREMENTS

SECTION 01510

PROJECT MEETINGS

PART 1 - GENERAL

1.01 PRE-CONSTRUCTION CONFERENCE(S)

A. Prior to the commencement of construction, a general information meeting shall be held with the Owner, Engineer, Contractor and other interested parties in attendance. The meeting shall cover the general features of the project and various requirements of the Owner, MDE, and the Engineer. This meeting will be held Operations Building at the Ocean Pines WWTP.

1.02 PROGRESS MEETINGS

A. During the duration of the contract, there will be Progress Meetings held once each month. The meetings will be attended by the Owner, Engineer, and Contractor and will be used to discuss the progress of the project and the coordination of subcontracts. Representatives of the Contractor will be required to attend all Progress Meetings. Representatives of subcontractors whose work may be discussed should also attend. Meeting will be held on the Island unless circumstances dictate otherwise.

B. It is imperative that progress meetings be held on a regular basis. If it becomes necessary to meet more frequently due to unforeseen conditions and problems, the meetings will be established to the satisfaction of the parties involved.

C. The Contractor's updated Construction Schedule shall be reviewed at each progress meeting.

D. Contractor shall submit progress photos as described in Section 01300, 1.11.

PART 2 – PRODUCTS

(Not used)

PART 3 – EXECUTION

(Not used)

*** END OF SECTION ***

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DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01520

BYPASS PUMPING SYSTEMS (IF NECESSARY)

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. The Contractor is required to furnish all materials, labor, equipment, power, maintenance, etc., to implement temporary bypass pumping systems as needed for the purpose of installing equipment and diverting flow as is required to comply with the Contractor's sequence of work and to maintain process operations at the Riddle Farm WWTP.

1.02 RELATED SECTIONS

- A. Section 01100: Summary of Work
- B. Section 01300: Submittals
- C. Section 01400: Quality Control

1.03 SUBMITTALS

- A. The Contractor shall provide a specific detailed description of each proposed bypass pumping system at least 30 days prior to the intended time of use.
- B. The submittal shall include, but not be limited to, the following:
 - 1. A written description of the plan.
 - 2. Quantity, capacity, and type (electric motor or engine driven) and location of all pumping equipment.
 - 3. Pump performance curves.
 - 4. The size, type and routing of all suction and discharge pipes and the means of connecting the system. If electric motor driven pumping equipment is proposed, Contractor shall be responsible for obtaining and paying for temporary electric service.
 - 5. Description of controls and emergency power supply.

C. Engineer shall review, but not approve, the bypass pumping system submittal. Engineer shall review for compliance to performance requirements only.

1.04 BYPASS PUMPING COORDINATION MEETING

A. Once the bypass pumping submittal has been reviewed by the Engineer and at least 14 days prior to the intended full time use of any bypass pumping system, a coordination meeting shall be held. Participants shall include: Contractor, Owner and Engineer.

B. No bypass pumping shall take place until the submittal has been reviewed by the Engineer and the coordination conference has taken place.

1.05 PERFORMANCE REQUIREMENTS

A. The design, installation and operation of the temporary bypass pumping system(s) shall be the Contractor's responsibility. The bypass system(s) shall meet the requirements of all codes and regulatory agencies having jurisdiction, including local noise ordinance.

B. The bypass pumping system must have a minimum capacity which matches that of the pumping system which is being bypassed.

C. The bypass pumping systems shall be tested in the presence of the Engineer and Owner to demonstrate a state of readiness of all of the equipment.

1.06 SPECIAL PRECAUTIONS

A. If any spills of raw wastewater occur due to the failure of the Contractor to maintain the temporary pumping when needed, the Contractor shall be responsible for all clean-up costs and any fines levied on the Owner by the state, federal or any other applicable agency.

PART 2 – PRODUCTS

2.01 PUMPS

A. The pumps and drives shall be rated for continuous duty and shall be capable of pumping the specified flow range without surging, cavitation or vibration. The pump shall not overload the driver at any point on the pump operating curve. The pump shall be suitable for use with raw unscreened sewage and trash. The pump shall be a self-contained unit designed for temporary use.

B. All pumps used shall be fully automatic self-priming units that do not require the use of foot-valves or vacuum pumps in the priming system or they can be submersible pumps. The pumps may be electric motor or diesel engine powered.

C. Pumps that are engine driven shall be on skid bases with a centralized lifting bracket and integral fuel tank. The pump shall be direct coupled to an electric start diesel engine. Provide an integral belt driven compressor to operate the air ejector priming system.

D. Contractor shall provide the necessary start-stop controls for each pump.

E. Pumps shall have capacity to match the pumping capability of the system(s) being bypassed.

2.02 PIPING

A. In order to prevent the accidental spillage of flows, all discharge systems must be constructed with positive, leak-proof connections.

PART 3 – EXECUTION

A. Installation shall include furnishing oil, fuel, grease, lubricants, tools and spare parts that may be required to maintain the operation of the pump throughout the construction period, as recommended by the manufacturer. The Contractor shall be solely responsible for maintaining the temporary bypass pumps and appurtenances. At the end of the construction period, the Contractor shall remove the pump and appurtenances.

B. The pumps shall be installed for temporary use only. The Contractor shall be responsible for proper operation of the complete pumping system, which includes pump, driver, controls and appropriate pipe connections, during the construction period.

C. Adequate hoisting equipment for each pump and accessories shall be maintained on the site.

D. The Contractor shall insure that both the short-term and long-term temporary bypass pumping system is properly maintained and a responsible operator/mechanic is available to be on site within 30-minutes following notification, at all times when pumps are operating.

E. Temporary bypass pumping system(s) shall be placed in service a minimum of 24 hours before any work may begin and shall demonstrate continuous trouble-free operation. It shall remain operable until all components of the new structure(s) have been tested and approved for operation.

F. Once written permission is issued, the Contractor shall remove all components of the temporary pumping systems. The Contractor shall perform all restoration work to the satisfaction of the Owner.

*** END OF SECTION ***

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01540

TEMPORARY MEMBRANE FILTRATION SYSTEM

PART 1 – GENERAL

1.01 SCOPE OF WORK

A. Furnish and install a mobile hollow-fiber system (MHFS) and appurtenances as shown on the contract drawings and described herein. Its purpose is to provide additional treatment capacity during construction activities. The Owner is currently using a pump & haul bypass system to add additional treatment system and this practice will continue during construction.

B. All required labor, materials and equipment and electrical power supply shall be provided by Contractor and included within bid fee schedule.

C. The MHFS shall be provided for a portion of the contract time and in concert with the Contractor construction schedule to provide the additional treatment capacity when either Train 1 and/or Train 2 are out-of-service for the equipment upgrades.

D. A separate schedule in the bid will be used for pricing purposes and final costs will depend on the length of time the MHFS is utilized for the project.

E. A proposed location and layout of a temporary membrane filtration is shown on the drawings; however, the overall dimensions and orientation can vary to best fit the needs of the project.

F. The scope of supply includes equipment, materials, and field services

1.02 RELATED SECTIONS

A. Section 01100: Summary of Work

B. Section 01300: Submittals

1.03 SUBMITTALS

A. The Contractor shall provide a specific detailed description of the proposed temporary membrane filtration system at least 60 days prior to the intended full-time use of the system.

- B. The submittal shall include, but not be limited to, the following:
1. A written description of the plan.
 2. Quantity, capacity, and type (electric motor or engine driven) and location of all equipment.
 3. The size, type and routing of all suction and discharge pipes and the means of connecting the system.
 4. Description of controls and power supply.
- C. Engineer shall review, but not approve, the temporary membrane filtration system submittal. Engineer shall review for compliance to performance requirements only.

1.04 COORDINATION MEETING

A. Once the temporary treatment system submittal has been reviewed by the Engineer and at least 30 days prior to the intended full-time use of the system, a coordination meeting shall be held. Participants shall include: Contractor, System Manufacturer, Owner and Engineer.

1.05 QUALIFICATIONS OF TREATMENT SYSTEM SUPPLIER

- A. The Owner has pre-qualified and selected Veolia as the vendor to supply the temporary membrane filtration system. Veolia has demonstrated an established record of providing MHFS in similar types of applications.
- B. The bidder may offer an alternate temporary membrane filter system subject to submission of detailed qualifications, listing of similar successful applications meeting the requirements of this project and subject to Owner approval.

1.06 PERFORMANCE REQUIREMENTS

A. The design, installation and operation of the temporary membrane filtration system shall be the Contractor’s responsibility. The system shall meet the requirements as described below. As described in the “Special Requirements” section of Specification Section 01100, they supplement will supplement membrane filtration capacity of the WWTP while either MBR Train 1 or 2 are out of service.

B. Design Criteria:

Model	ZW500D, Mobile MBR UF Process Container
Configuration	One Train 4 Cassette

Performance Data

Average Product Flow	100,000 gpd max
Feed Flow	70-75 gpm
Design Recovery	90% to 95%
Design Temperature Range	35-90°F

Installation and Utility Requirements

Feed Water Connection	4 inch FF flanges, stainless, 8 PSIG TO 20 PSIG
Product Water Connection	6 inch RF flange, stainless, <15 PSI
Backwash Connection	6 inch RF flange, Stainless, <15PSI
Permeate Tank Drain Connection	6 inch ANSI flange
Air Requirement	17.3 SCFM@175PSIG 1Instrument Air compressor Installed in the container, 760SCFM @5 PSIG Blower Installed in container
Inlet Water Pressure	10 psig (69.9 kPa) minimum 80 psig (551.6 kPa) maximum (no pressure spikes permitted above this value)
Power	187A @ 380 (400) VAC and 162 amps @ 460(480) VAC
Dimensions (LxWxH)	40'L x 8.0'W x 9.5'H (40' HC ISO Container) Top Head Removable
Shipping Weight Estimate	50,000 LBS / [22,680 Kg]
Operating Weight Estimate	102,500 LBS / [46595 Kg]

Features Included

- Online raw water turbidity meter
- Online Filtrate (permeate) turbidity meter

D. All systems shall be tested in the presence of the Engineer and Owner to demonstrate a state of readiness of all of the equipment.

1.07 SPECIAL PRECAUTIONS

A. If any spills of wastewater occur due to the failure of the Contractor to maintain the temporary membrane filtration system when needed, the Contractor shall be responsible for all clean-up costs and any fines levied on the Owner by the state, federal or any other applicable agency.

1.08 EXISTING CONDITIONS

A. The suggested connection points for the system are shown on the Contract Drawings. The Contractor is responsible for field verifying all existing conditions and applicable interfaces with temporary membrane filtration system.

PART 2 – PRODUCTS

2.01 TEMPORARY MEMBRANE FILTRATION SYSTEM

- A. The temporary membrane filtration system shall be as manufactured by:
1. Veolia WTS Services, USA;
 2. Or equal approved equal.
-

2.02 PIPING

- A. In order to prevent the accidental spillage of flows, all piping systems conveyed wastewater must be constructed of rigid pipe with positive, leak-proof connections.
- B. Pipe 8 inches and larger shall be flanged ductile iron or high density polyethylene pipe with fused joints for a leak-proof piping system.

2.03 TEMPORARY PLUGS

- A. Plugs shall be inflatable and constructed of specially treated industrial fabric and reinforced neoprene. Plugs shall be equipped with steel pull rings and aluminum end clamps.
- B. All plugs shall be firmly attached to a stationary object at ground level by a steel cable in order to prevent loss of plug in the pipeline.

PART 3 – EXECUTION

- A. Installation shall include furnishing oil, fuel, grease, lubricants, tools and spare parts that may be required to maintain the operation of the system throughout the construction period, as recommended by the manufacturer. The Contractor shall be solely responsible for maintaining the temporary membrane filtration system and appurtenances; however, the Owner will operate the system while it is in use. At the end of the construction period, the Contractor shall remove the system and appurtenances.
- B. The system shall be placed in service a minimum of 3-Days prior to either MBR Train 1 or 2 may be taken out of service and shall demonstrate continuous trouble-free operation. System shall remain operable until all components of the new Work have been tested and approved for operation. At that point, the system shall be shut off and regular operation of the improvements will begin. The system shall stay intact until the new improvements demonstrate 7 consecutive days of continuous trouble-free operation.
- C. Once written permission is issued, the Contractor shall remove all components of the temporary system. The Contractor shall perform all restoration work to the satisfaction of the Owner.

*** END OF SECTION ***

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01600

MATERIALS AND EQUIPMENT

PART 1 - GENERAL

1.01 EQUIPMENT AND PRODUCTS SPECIFIED

A. Where any item of equipment or product or system or material is specified, it is to be understood that equal quality equipment or products or systems or materials, of either a named manufacturer or of an unnamed manufacturer, which meet the detailed requirements of the specifications, are intended. In each case, the equipment, product, material or system is subject to the approval of the Engineer as to the equality thereof. It is distinctly understood that: (1) the Engineer and the Owner are to use their own judgment in determining whether or not any item of equipment or product or material proposed is equal in quality to that specified; (2) the decision of the Engineer and the Owner on all such questions of equality shall be final; and (3) in the event of any adverse decision by the Engineer or Owner, no claim of any sort shall be made or allowed against the Engineer or the Owner.

B. Substituted items or items other than those named shall be equal or better in quality and performance and must be suitable for the available space, required arrangement and application. The Contractor shall submit any and all data necessary to determine the suitability of substituted items.

C. If any submitted equipment necessitates changing architectural or structural items, or electrical, water, gas, air or other utility services from the sizes, capacities and configurations shown on the Drawings, it shall be the Contractor's responsibility to bear the cost of engineering fees to analyze, design, specify and formulate the construction changes necessitated by the proposed deviations from the specified equipment and/or the Contract Drawings. All re-designs shall bear the seal and be the responsibility of a Professional Engineer.

D. Substituted items are warranted by the Contractor to perform equal or better than those specified. Substituted items failing to do so will be replaced by the Contractor at no cost to the Owner. No excuses such as improper design, construction, operation, or maintenance shall be accepted.

1.02 "OR EQUAL" SPECIFICATIONS

A. The specifications have been subjected to prior review with the intent of removing proprietary, exclusionary or discriminating requirements other than those

based upon performance, unless the requirements are necessary to test or demonstrate a specific thing or to provide interchangeability of parts and equipment.

B. In a few sections of the specifications, an item of material or equipment is specified by the name of a manufacturer without addition of the "or equal" expression, it is to be understood that these items are so specified for reasons of standardization and to provide interchangeability of parts and equipment.

C. Minor items including such articles as electrical fittings, plumbing fittings, hardware and other similar articles will be identified by one brand name to generally indicate design. For these items, a substitution of equal items are generally acceptable by the Engineer.

1.03 SINGULAR NUMBER

A. Where material, a device or part of the equipment is referred to in the singular number, it is intended that such reference shall apply to as many items of material, devices or parts of the equipment as are required to complete the installation.

1.04 EQUIPMENT UNIFORMITY

A. All pumps, blowers, valves and other multiple-unit equipment shall be, to the greatest extent possible within its category, the product of a single manufacturer.

1.05 STORAGE AND PROTECTION OF MATERIALS AND EQUIPMENT

A. All equipment and materials provided and work performed under this Contract shall be protected from damage before and after installation. The Contractor shall be responsible for work, equipment, and materials until inspected, tested and finally accepted.

B. During construction, the open ends of work shall be effectively closed with temporary covers or plugs to prevent the entry of foreign material.

C. Where permanent equipment called for under this Contract is installed before the erection of adequate protective structures, the Contractor without additional compensation therefore, shall provide approved effective and durable covers for fully protecting such equipment against damage from the elements or from any other cause.

D. Electrical equipment shall be carefully and effectively covered with waterproof material and otherwise protected at all times from the elements.

E. All structures, machinery, equipment, piping, electric conduit, wiring and accessories and appurtenances shall be adequately supported and safeguarded against all damage or injury during performance of work under this Contract. The Contractor shall be responsible for all damage or injury resulting from his operations

and shall repair such damage immediately and to the satisfaction of the Engineer and the Owner.

F. Store and protect products in accordance with the manufacturer's recommendations.

G. Uncovered Storage:

1. The following types of materials may be stored out-of-doors without cover:
 - a. Reinforcing steel
 - b. Piping
 - c. Castings
 - d. Handrailing
2. Store the above materials on wood blocking so there is no contact with the ground.

H. Covered Storage:

1. The following type of material may be stored out-of-doors if covered with material impervious to water:
 - a. Rough lumber
 - b. Masonry units
2. Tie down covers with rope, and slope to prevent accumulation of water on covers.
3. Store materials on wood blocking.

I. Fully Protected Storage:

1. Store all products not named above in buildings or trailers which have a concrete or wooden floor, a roof and fully closed walls on all sides.
2. Provide heated storage space for materials which would be damaged by freezing.
3. Protect mechanical and electrical equipment from being contaminated by dust, dirt and moisture.
4. Maintain humidity at levels recommended by manufacturers for electrical and electronic equipment.
5. Temporarily connect equipment with built-in space heaters to a power source and keep heaters in operation.
6. Prior to installation of the units, they shall be stored at locations approved by the Engineer.

PART 2 – PRODUCTS

(Not used)

PART 3 – EXECUTION

(Not used)

*** END OF SECTION ***

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01700

CONTRACT CLOSEOUT

PART 1 – GENERAL

1.01 DEFINITIONS

A. Substantial Completion: The project will be considered substantially complete when equipment and systems have been installed and tested and the facility is ready

1.02 CLEANUP

A. Execute final cleaning prior to final inspection.

B. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.

C. Clean filters of operating equipment.

D. Clean site; sweep paved areas, rake clean restored surfaces.

E. Remove waste and surplus materials, rubbish, sheds, tools and construction facilities from the site.

1.03 TOOLS, ACCESSORIES AND SPARE PARTS

A. The Contractor shall, unless otherwise stated, furnish with each type, kind and size of equipment, one complete set of any special tools and appliances which may be needed to adjust, operate, maintain or repair the equipment.

B. Each piece of equipment shall be provided with a substantial name plate, which is securely fastened in place and clearly inscribed with the manufacturer's name, year of manufacture and principal rating data.

C. Where the Specifications require spare parts to be furnished by the Contractor, said spare parts for each item of equipment shall be kept separate and tagged to identify the specific item of equipment to which they belong, shall be packaged so as to preclude damage from handling and storage, and shall be bagged or packaged together where items are small in dimension.

1.04 LUBRICATION CHART AND LUBRICATION

A. The Contractor shall furnish the Owner a lubrication chart for all equipment furnished or installed by him. The chart shall include the following for each item of equipment:

1. Name of the item.
2. Location of the item.
3. Each point of lubrication on the item.
4. For each point of lubrication, the identification of the lubricant recommended and the recommended frequency of lubrication.

B. The information on the chart shall be developed from manufacturers' printed data or from manufacturers' specific recommendations.

C. The identification of the lubricant by manufacturer's name and product identification (such as Mobil X421) shall be furnished. The name of the manufacturer to be used will be furnished to the Contractor by the Owner.

D. Following the initial operation of the equipment the Contractor shall re-lubricate, changing and adding lubricants, at the intervals or frequency as recommended by the manufacturer until final acceptance.

1.05 DELAYS AND EXTENSIONS OF TIME

A. The Contractor shall not be entitled to payment or compensation of any kind from the Owner for direct, indirect or impact damages, including but not limited to costs of acceleration arising because of hindrance or delay from any cause whatsoever, whether such hindrances or delays be reasonable or unreasonable, foreseeable or unforeseeable, or avoidable or unavoidable; provided, however, that this provision shall not preclude recovery by the Contractor of damages for hindrances or delays due solely to fraud or bad faith on the part of the Owner or his agents.

B. In the event the Contractor requests an extension of the Contract Time, he shall furnish such justification and supporting evidence as the Owner may deem necessary for a determination of whether or not the Contractor is entitled to an extension of time under the provisions of the Contract. The Owner shall base his findings of fact and decision on such justification and supporting evidence and shall advise the Contractor in writing thereof. If the Owner finds that the Contractor is entitled to any extension of the Contract Time, the Owner's determination of the total number of days' extension shall be based upon the currently approved progress schedule and on all data relevant to the extension. Such data will be incorporated into the schedule in the form of a revision thereto, accomplished in a timely manner. The Contractor acknowledges and agrees that actual delays in activities or time required to accomplish change order activities which, according to the schedule, do not affect the critical path and therefore do not

have any effect upon Contract completion time, will not be a basis for an extension of time.

1.06 WARRANTY AND GUARANTEE

A. After the project is substantially complete and the Engineer has issued the Certificate of Substantial Completion, all guarantees and warranties shall commence. The Contractor is reminded that certain pieces of equipment may be installed, tested and operational before substantial completion. Applicable Contract Lump Sump prices should include any increases for extending manufacturers warranty and guarantees to cover this early start up and the normal warranty and guarantee period outlined in this section.

B. The Contractor warrants and guarantees to the Owner for a period of two (2) years following:

1. That all materials and equipment provided under this Contract are new, unless otherwise specified.
2. That all work is of good quality and free from faults and defects and in accordance with the requirements of the Project Manual.
3. That all equipment and systems and each and every part thereof, shall operate (with proper care and attention) in a satisfactory and efficient manner, and in accordance with the Project Manual.
4. That the Contractor shall, upon receipt of written notice from the Owner, promptly replace with workmanship and materials which comply with these Specifications, and re-execute, correct or repair, without cost to the Owner, all work which may be found to be not in accordance with the Project Manual.
5. That the guarantee obligations assumed by the Contractor under this Project Manual shall not be held or taken to be in any way impaired because of the Specifications, indication or approval by or on behalf of the Owner of any articles, materials, means, combinations of things used or to be used in the construction, performance and completion of the work, or any part thereof.
6. That no use or acceptance by the Owner of the work or any part thereof, nor any failure to use the same, nor any repairs, adjustments or corrections made by the Owner due to the Contractor's failure to comply with any of his obligations under the Project Manual, shall impair in any way the guarantee obligations of the Contractor under this Contract.

C. Contractor shall post a maintenance bond in the amount of 5% of the full contract value.

D. If the Contractor fails to make repairs during the guarantee period, the Owner may cause such damaged or defective work to be repaired and made good at the cost and expense of the Contractor, including, but not limited to, compensation if required for

additional professional services. The Contractor shall also bear the expenses of making good all work destroyed or damaged by the correction, removal or replacement of his defective work.

1.07 TESTING OF EQUIPMENT AND SYSTEMS

A. Preliminary Testing:

1. When the Contractor has completed the installation of all equipment including electrical appurtenances, he shall perform preliminary testing on each piece of equipment.
2. Contractor shall provide for the inspection of each piece of equipment by authorized and qualified manufacturer's representatives. These manufacturer's representatives shall verify that all equipment has been installed properly.
3. Manufacturer's representatives shall verify that the individual equipment and/or components are functioning in accordance with the Project Manual.
4. The manufacturer of each piece of equipment shall provide a manufacturer's certificate in accordance with Section 01300 - SUBMITTALS.

B. Pre-Final Testing:

1. After receipt of all manufacturer's certificates, the Contractor will be required to perform wet tests on all pieces of equipment.
2. Tanks shall be filled to operating water level and allowed to stand 48 hours. The Contractor may utilize treated wastewater effluent from the existing facility. Contractor will be responsible for furnishing piping and pumps as necessary to fill tanks. Contractor will also be responsible for disposing of water once tests are completed.
3. Pre-final testing shall include the actual running of equipment to ensure that all electric and controls are properly connected. This testing shall be done under the supervision of the manufacturer's representative.
4. Pre-final testing shall include operation of the system components with clear water for three continuous days (unless otherwise noted) and shall be completed prior to the final testing / plant startup.
 - a. Clear water operation testing does not apply to electrical and control systems.
 - b. Clear water operation testing is required for new systems as well as modified existing systems unless otherwise noted.

C. Equipment Start-Up:

1. Permanent safety and protection devices, unless specifically exempted by the Owner and Engineer, shall be in place and operational prior to plant startup. Safety devices shall include, but not be limited to, fall protection,

hand railing, grating and floor plates, leak detection, motor thermal and overload protection, emergency power generation, equipment lookouts, floatation devices, fire alarms and systems, ventilation systems, and lighting in operational areas in or directly related to the system to be started. All open excavations in or adjacent to the operational areas shall be covered or suitable fall protection shall be provided to protect operator's personnel.

2. Readiness to Operate: When the Contractor has substantially completed the work and when Preliminary, Pre-Final Tests are complete, he shall notify the Engineer in writing, requesting permission to start up and requesting diversion of the sewage flow to the plant. The Engineer will respond in writing, authorizing the start up of the plant or will state reasons why the operation may not commence.
3. Plan of Operation: The Contractor shall include with his request for permission to start up and operate the plant a schedule for demonstrating the system operation and for the completion of the remainder of the project. The schedule shall include a minimum 30-day start-up and biological acclimation period.
4. Actual operation of the plant during the start-up and acclimation period will be by the Owner. However, the Contractor shall make available his personnel to correct any deficiencies that are discovered during this thirty (30) day start-up period.
5. From time to time during the start-up/acclimation period, the Contractor shall demonstrate, as required by the Engineer, that all equipment and systems are capable of operating throughout the full range of specified operation.
6. The Contractor shall perform all equipment maintenance including, but not limited to, re-lubricate, changing and adding lubricants, at the intervals or frequency as recommended by the manufacturer during the start-up period.
7. Each piece of equipment shall be tested including all components necessary for that system to fully function for its intended purpose, including plumbing, process equipment, piping, safety equipment, power, instrumentation, and controls.
 - a. For equipment intended to be operated on an intermittent basis (i.e., during normal working hours between 7:00 a.m. to 3:30 p.m.), the Contractor shall demonstrate equipment reliability by operating the equipment for a minimum of 8 hours over a 4-day period. No single period of operation shall exceed eight hours of operation for such systems.
 - b. For equipment intended to be operated on a continuous basis, the Contractor shall demonstrate equipment reliability by operating the equipment for 24 hours per day continuously over a 5-day period.

1.08 FINAL ACCEPTANCE

A. Upon completion of all work under this Contract including the testing of equipment, and placing the plant in operation, the Contractor shall request, in writing, final acceptance by the Owner.

B. Upon receipt of the request, the Engineer, the Owner, and the Contractor will make a Final Inspection of the Project to determine the status of completion as follows:

1. If the Engineer does not consider the Project to be complete, the Engineer will notify the Contractor in writing of this fact, and will include the reasons why the Project is not considered complete.
2. Any items not satisfactorily completed or unsatisfactory as determined by the Engineer, shall be promptly remedied or completed.
3. Upon satisfactory correction of defects or incomplete information or work, the Engineer will certify to the Owner that the plant is finally complete.

PART 2 – PRODUCTS

(Not used)

PART 3 – EXECUTION

(Not used)

*** END OF SECTION ***

DIVISION 02 - SITEWORK

SECTION 02010

SUBSURFACE EXPLORATION

PART 1 - GENERAL

1.01 DESCRIPTION

A. Prior to submitting his Bid, the Bidder shall make his own investigations of the on-site conditions and materials and shall base his Bid upon his own findings. The Owner will not approve any request for change order based upon the contention that subsurface conditions or materials vary from those indicated on the Drawings. The Contractor's bid shall be based upon his own investigation of these materials and conditions.

B. Neither the Engineer nor the Owner guarantees the soil condition in the area of construction. Contractor should note that subsurface exploration report was completed as part of previous work at facility. As such, portions of the report are not applicable to work contained herein.

1.02 EXISTING SUBSURFACE LINES

A. All known subsurface lines, pipes, conduits, and structures are shown on the plans and profiles. The lines shown are based upon the best available plans and maps. The locations have not been verified by test pits and the Engineer/Owner assumes no responsibility for the accuracy of the Drawings. In any area where the Contractor must make connections to or cross existing lines it shall be his responsibility to test pit the lines and verify the locations to his satisfaction. In the event that lines are not found located as shown on the plans the Contractor shall notify the Engineer so that an evaluation can be made as to the magnitude and method of any adjustments in the plans. The elevations of the pipelines at these locations are critical, and thus, these locations should be test pitted as soon as possible after the Notice to Proceed. The cost of these test pits shall be included in the lump sum price bid.

B. **The Contractor shall be required to verify the location and depth of all critical lines using test pits before beginning work.**

C. The Contractor shall be solely responsible for any damage to any underground or aboveground lines encountered in any manner during construction. When crossing and working in the vicinity of existing lines it will be the Contractor's responsibility to properly support and maintain the operation of the lines. Extreme care must be exercised in excavation and refill operations. The Contractor will correct at his own expense any

damage caused to existing lines.

PART 2 - PRODUCTS

(Not required)

PART 3 - EXECUTION

(Not required)

*** END OF SECTION ***

DIVISION 02 - SITEWORK

SECTION 02050

DEMOLITION

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Includes the removal and disposal of existing equipment, supports, piping and other miscellaneous demolition activities.
- B. Submit proposed demolition and removal procedures to the Engineer for approval before work is started.
- C. Comply with applicable codes and accident and fire prevention regulations.

1.02 JOB CONDITIONS

- A. Dust Control: Comply with all dust regulations imposed by local air pollution agencies.
- B. Protection: Exercise care during demolition work to confine demolition operations. The physical means and methods used for protection are at the Contractor's option. However, the Contractor will be completely responsible for replacement and restitution work of whatever nature at no expense to the Owner.
- C. Explosives: Use of explosives will not be permitted.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Materials needed or required for temporary protection in the form of barricades, fences, enclosures, etc., may be "used" construction materials of sound condition and reasonably clean. However, the condition of same materials shall meet or exceed the requirements of governing agencies or approving bodies as may be involved with the work.
- B. Equipment, machinery and apparatus (motorized or otherwise) used to perform demolition work may be "used" as chosen at the Contractor's discretion, but which will perform the work within the limits of the Contract requirements.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Prior to performance of the actual work, carefully inspect the site and locate those objects and structures designated to be demolished and/or partially removed.
- B. Locate existing exposed and buried active utilities and determine the requirement for their protection, or their disposition with respect to the demolition work. Locate pipes and conduits as described in Section 02010 - SUBSURFACE EXPLORATION.

3.02 PERFORMANCE

- A. General: The means and methods of performing demolition operations is the sole responsibility of the Contractor.
- B. Debris Removal: All demolition debris shall become the property of the Contractor and shall be disposed of off site in accordance with local and State regulations.
- C. Abandoned Pipes and Conduits: Remove pipes, conduits, underdrains and such other existing lines being abandoned to the extent required not to interfere with the new work. Permanently cap such existing abandoned lines.
- D. Debris and Rubbish: Remove and transport debris and rubbish in a manner that will prevent spillage on streets or adjacent areas. Clean up spillage from streets and adjacent area.
- E. Salvage: The Owner shall have the right to claim as salvage, any of the materials removed under the work of this Contract and when the Contractor has removed such items, should such right of salvage be exercised by the Owner, the Contractor shall move and neatly store removed items on the site in a location agreeable to the Owner, in a manner approved by the Engineer.

3.03 PREPARATION

- A. Two weeks prior to performing any demolition, there shall be a coordination meeting between the Contractor, Owner, and Engineer to discuss the Contractor's Demolition Plan and related procedures. Items to be discussed shall be, but not limited to, dust control, sequence of work, removal of material, protection of existing equipment, access and egress of material, etc. Demolition procedures must be coordinated with the Owner's operating personnel and operations, and adjusted accordingly, if necessary.
- B. Erect and maintain temporary partitions and weatherproof closures to prevent spread of dust, odors, and noise in areas of continued Owner occupancy.

- C. Protect existing site-related items such as pavements, walkways, parking areas, curbs, aprons, and landscaping features, which are not to be demolished.
- D. Protect existing electrical; heating, ventilating, and air-conditioning; and plumbing systems, including related components, which are not to be demolished.
- E. Remove and dispose of all demolition materials in an off-site location chosen by the Contractor and approved by the Owner.

3.04 DEMOLITION REQUIREMENTS

- A. The operation of the facility will be maintained during the entire construction period. The Contractor shall provide all necessary temporary roadways, walkways, platform, stairs, etc., as required to allow access to all areas of the facility.
- B. Furnish all signs, lights, railings, barricades, and other items as necessary to meet safety regulations. Adequate protection of persons and property shall be provided at all times.
- C. Provide dust control for all new and existing equipment. All electrical equipment, control panels, and appurtenances shall be covered and free from dust. Suspended dust shall be kept to a minimum, and the Contractor shall clean up all dust at least once per day for the duration of all demolition and once after demolition is complete.
- D. The Owner must maintain current operations and treatment throughout entire treatment plant. Demolition and downtime must be kept to a minimum when replacing equipment.
- E. The Contractor shall coordinate demolition removal with the Owner's operating procedures. All demolition material shall be picked up and disposed of at the end of each day.
- F. Provide all necessary appurtenances to adequately support remaining piping after required portions are removed.
- G. Contractor is required to complete all demolition required to install new structures and equipment.

3.05 DEMOLITION

- A. Disconnect and remove designated process piping systems, including valves and fittings; provide temporary capping of those segments of the system to be reused. Plug openings in walls and floors where utilities are removed.
- B. Detach, dismantle, and remove metal components of process equipment from

designated tanks, including miscellaneous metal work items associated with access to and operation of such equipment.

C. Patch and refinish existing visible surfaces to match “new” appearance of adjacent surfaces.

H. All water, sewer, drain, process plumbing pipelines that are to be terminated shall be done so as follows:

1. Piping penetrating walls in buildings, tunnels, and crawlspaces shall be cut at the inside face of the wall and sealed with concrete flush with wall; pipe outside of wall shall be removed to 12 inches from the face of the wall and capped watertight. Cast iron pipe shall be capped using a blind flange or a retained gland and lug as required (Dresser Style 127, Smith Blair or equal). Copper and steel lines shall be sealed by soldering or welding a cap to the line.
2. Piping penetrating floors shall be removed flush with floor and sealed with grout. Final floor surface shall match the adjacent areas.
3. Underground piping shall be removed and the end filled with grout to form a watertight seal. Pipe shall be removed to the point nearest the building wall penetration that has been excavated.

3.06 SALVAGE

A. It is the Owner’s right to retain any existing component demolished or otherwise removed from the existing facility by the Contractor.

B. Prior to beginning any demonstration activities, the Contractor shall offer the Owner the opportunity to select any components identified in the Contractor Documents for demolition which the Owner would like to have salvaged and turned over to the Owner rather than disposed of by the Contractor.

3.07 RELOCATED EQUIPMENT

A. Relocated equipment shall be removed from current location and reinstalled at designated new location where indicated in the Contract Documents.

B. Any damage to the equipment during removal, relocation and installation shall be repaired at the Contractor’s expense.

*** END OF SECTION ***

DIVISION 02 - SITEWORK

SECTION 02100

SITE PREPARATION AND ROUGH GRADING

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Includes the furnishing and use of equipment and labor required for clearing and grubbing, topsoil stripping, and rough grading.
- B. Related Work Specified Elsewhere:
 - 1. Section 02220: Structural Excavation, Backfill and Compaction
 - 2. Section 02540: Erosion and Sediment Control

1.02 QUALITY ASSURANCE

- A. Tests and Inspections:
 - 1. Tests and inspections will be performed by an independent testing agency employed by the Contractor. Work of the testing agency includes but is not limited to:
 - a. Verification of subgrade suitability prior to fill placement.
 - b. Monitor fill placement and compaction operations.
 - c. Prior approval of material used as fill and backfill.
 - d. Verification of compaction by in-place density tests.
 - 2. Contractor shall provide access for and shall assist testing agency in acquisition of samples and performance of tests involving equipment outside the normal equipment used by the testing agency. Such assistance provided by the Contractor shall be accomplished at no cost to the Owner.
- B. Codes and Standards: Perform excavation work in compliance with applicable requirements of governing authorities having jurisdiction.
- C. Reference Standards:
 - 1. American Association of State Highways and Transportation Officials:
 - a. AASHTO T 180, Moisture-Density Relations of Soils, using a 10-lb. Rammer and an 18-in.Drop.
 - b. AASHTO T 191, Field Determination of Density of Soil in Place.

2. American Society for Testing and Materials: ASTM D 2167, Density of Soil in Place by the Rubber-Balloon Method.

1.03 JOB CONDITIONS

A. Environmental Requirements:

1. Do not perform grading when soil or weather conditions are unsuitable. Unsuitable conditions include moisture saturated or frozen in place soil and precipitation of any kind present on the soil or occurring during the work.
2. Exercise the necessary means and methods to control dust on the site as well as in the off-site work areas where excavation and grading are required.
3. Do not leave the site in a dusting condition following the work of this Section. If necessary, employ a watering schedule to control the dust.
4. Do not use frozen material in performing the work or place materials on frozen surfaces.
5. When it is necessary to haul soft or wet soil material over roadways, use suitably tight vehicles to prevent spillage. Clear away spillage of materials on roadways caused by hauling at no expense to the Owner, County or State.
6. Plan work so as to provide adequate protection during storms with provisions available at all times for preventing flood damage.

B. Protection:

1. Assume all risks attending the presence or proximity of overhead or underground utilities, pipes and conduits.
2. Complete responsibility for replacement and restitution work of whatever nature to the above, as damaged or destroyed by work of this Contract, rests solely with the Contractor and at no expense to the Owner.

C. Excess Materials: No right of property in materials is granted the Contractor of excess on-site materials prior to completion of site work. This provision does not relieve the Contractor of his responsibility to remove and dispose of surplus excavated materials. Unsuitable material such as sod, stumps and spongy soil as well as excess hard consolidated materials shall also become the property of the Contractor and shall be disposed of legally off-site.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Fill Material: On-site excavated soil materials free of topsoil, plant life, lumber, metal, refuse and rock.

PART 3 - EXECUTION

3.01 PREPARATION

A. Clearing and Grubbing: Grub and clear surface and remove surface materials of whatever nature over pipe trenches, structure sites and areas to be graded, paved or repaved.

B. Salvaged Topsoil: Within the areas indicated for grading, strip turf and topsoil to the depth of suitable topsoil material and stockpile for subsequent topsoiling operations.

C. Stockpiling: Place topsoil storage piles within the limits of the project, and at locations not interfering with the prosecution of work.

D. Proof-rolling: After grubbing and stripping is accomplished throughout, exposed subgrade in areas to receive fill or where structures or pavement will be located at grade shall be proof-rolled with vibratory roller to provide surficial densification and to locate any near surface pockets of soft or loose soils. Unsuitable materials so exposed shall be suitably densified or otherwise removed and refilled as directed by the Engineer.

3.02 PERFORMANCE

A. Rough Grading: Cut and fill to within 0.2 foot of the correct subgrade elevations. Set elevation of top of subgrade under paved areas to bottom of the pavement base. Set elevation of the top of subgrade under areas to receive topsoil, 4 inches below finished grades.

B. Fill:

1. Fill material shall be placed and spread in uniform, near horizontal layers, not exceeding 8 inches in thickness, prior to compaction. Each layer shall be thoroughly tamped or rolled by means of approved compaction equipment.
2. The Contractor shall add sufficient water during tamping and rolling to assure complete consolidation of fill material. If material is too wet for satisfactory compaction, it shall be allowed to dry as required, prior to compaction. In general, moisture content should be maintained within 2

percent of optimum value depending on soil type and required compaction.

3. If sufficient fill material is not available from excavation, additional borrow material shall be imported. Borrow material shall be sand, gravel, silty sand or combination thereof. Borrow material shall be free of topsoil, plant life, lumber, metal, refuse and rock or similar hard objects. Such imported fill shall be of consistent type and quality, as approved by Engineer.

C. Compaction:

1. Fill materials in structural and pavement areas shall be compacted to a minimum dry density of 95 percent of the maximum dry weight density as determined by the Modified Proctor Test, ASTM D1557 or AASHTO T-180, Method A. Structural and pavement subgrade in cut areas shall be densified to the same degree of compaction. Fill material in landscape or other non-structural areas shall be compacted to a minimum dry density of 90 percent of optimum.
2. Compaction shall be accomplished with approved equipment. The equipment shall make sufficient passes to ensure that the required density has been uniformly obtained.
3. Each layer of fill shall be inspected, tested and approved by testing agency prior to placement and compaction of next lift.

D. Excavation of ditches and swales shall include shaping and finishing of earth bottom and slopes to the line and grade indicated. Care shall be taken not to over-excavate. Excessive ditch or swale excavation shall be backfilled with suitable material at no cost to the Owner. Excavation shall be maintained free from leaves, brush, sticks, trash and other debris.

*** END OF SECTION ***

DIVISION 02 - SITEWORK

SECTION 02151

SHEETING, SHORING, AND/OR BRACING

PART 1 - GENERAL

1.01 DESCRIPTION

A. Related work specified elsewhere:

1. Section 02401: Dewatering
2. Section 02220: Structural Excavation, Backfill and Compaction
3. Section 02221: Utility Excavation, Backfill and Compaction

1.02 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies:

1. Shoring materials and installation work shall conform to Federal, State and local laws, rules, regulations, requirements, precautions, orders and decrees.
2. Provide material for all sheet piling, sheeting, bracing and shoring and drive or set in place in accordance with Federal, State and local laws for excavations and construction; and as may be required to protect the workers and the plant personnel, or to maintain the trench widths specified in Section 02221 - UTILITY EXCAVATION, BACKFILL AND COMPACTION regardless of whether the same is or is not considered necessary by the Contractor.

1.03 RESPONSIBILITY FOR PERFORMANCE

A. The responsibility for the performance of shoring methods and devices, including slopes, if any, shall lie entirely with the Contractor. The correction of settlement and damage to persons and property due to settlement shall be the responsibility of the Contractor.

B. Shoring shall be executed in such a way that underground utilities are not damaged or disturbed, and so that access to them is not hindered.

C. The failure or refusal of the Engineer to suggest the use of bracing or sheeting, or a better quality, grade, or section, or larger sizes of steel or timber, or to suggest sheeting, bracing, struts, or shoring to be left in place, shall not in any way or to any

extent relieve the Contractor of any responsibility concerning the condition of excavation or of any of his obligations under the Contract, nor impose any liability on the Engineer or the Owner, nor shall any delay whether caused by any action or want of action on the part of the Contractor, or by any act of the Engineer, Owner, or their agents, or employees, resulting in the keeping of any excavation open longer than would otherwise have been necessary, relieve the Contractor from the necessity of properly and adequately protecting the excavation from caving or slipping, nor from any of his obligations under the Contract relating to injury to persons, or property, nor entitle him to any claims for extra compensation.

1.04 SUBMITTALS

A. Submit for Engineer's review the design of the sheeting and shoring system for the denitrification filter excavation. Design shall bear the seal of a State of Maryland licensed professional engineer.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Props, shores, jacks, needles, braces, sheeting, cribbing, etc., shall be materials standard with and available to the Contractor, which are of proper size, and are in good serviceable condition. Materials that are unsuitable for the intended purpose, or which are severely damaged shall not be used.

PART 3 - EXECUTION

3.01 INSTALLATION

A. The Contractor shall support the sides and ends of all excavations, wherever necessary, with sheeting, shoring and/or bracing of the quality and character as required. Using skilled labor, drive or set sheeting, sheet piling, braces or shores in place shall be so arranged such that they may be withdrawn as the excavations are backfilled, without injury to piping and structures, and without injury to or settlement of adjacent structures and pavements.

B. Excavations, if over four feet in depth, unless in solid rock, hard shale or hardpan, shall be shored, sheeted and braced.

C. Where the cross section of the horizontal stringer or wale is not square, the greatest dimension shall be placed in a horizontal plane to gain the maximum strength of the member.

D. Where a mechanical digger is used, the sheeting and bracing shall be placed as close as possible to the lower end of the boom.

E. The bracing shall be held in place by hydraulic jacks, screw jacks or by cross braces cleated and wedged in place. Where the width of the excavation is such that horizontal bracing is not feasible, diagonal cross bracing shall be installed such that the bottom of the bracing shall bear against a footing in the earth at the bottom of the excavation and adequate means shall be taken to prevent that bracing from kicking out. In hand excavated trenches, cleats shall be securely fastened to join the ends of braces to stringers to prevent the braces from being knocked out of place.

F. Excavated material and superimposed loads shall not be placed nearer than 18 inches to the sides of a trench or other excavation, unless bracing has been installed which is designed to withstand the load.

G. When trenches are undercut, they shall be shored to safely support the overhanging material. The design of shoring shall be performed and sealed by a professional structural Engineer registered in the State of Maryland. The design shall be submitted to the Engineer for review prior to installation.

H. If a trench is cut, or an embankment is created by excavating or grading alongside an existing structure, object or underground utility, and the footing or elevation of the bottom of the structure, object, or utility is nearer to the trench or embankment than the angle of repose for the soil, the sidewall of the trench or the embankment shall be rigidly and adequately supported and braced. If the method of, and the materials to be used for support are not indicated on the Contract Drawings, same shall be submitted to the Engineer for review, in accordance with paragraph G above, prior to the start of the excavation or grading work.

I. When the depth of the trench requires two (2) lengths of sheet piling, one above the other, the lower length shall be set aside the bottom stringers or wales of the upper length and driven down and braced as the excavation continues.

J. Remove sheeting, bracing and shores as trenches and other excavations are being backfilled.

1. All sheeting, shoring and/or bracing in excavations shall be withdrawn in stages on both sides of trenches, to prevent lateral movement of the pipe.
2. In withdrawing sheeting and sheet piling, exercise care to insure that all voids or holes left by planks as they are withdrawn are backfilled and thoroughly rammed with thin rammers provided specially for that purpose.
3. Exercise care to carry backfill up evenly on all sides of items installed in excavations.

K. Where the Engineer permits the Contractor to leave sheet piling in place at the Contractor's own request, the Contractor will not be entitled to any extra compensation.

L. Where indicated on the drawings, sheeting ordered left-in-place by the Engineer shall be cut-off a minimum of two feet below finished grade. The Contractor shall remove and properly dispose of the material cut-off without compensation, therefore.

M. Wherever necessary in quicksand, or soft ground, or for the protection of any structure or property, sheeting shall be driven without extra compensation to such additional depth below the bottom of the trench as may be required or directed.

N. A trench box may be used in lieu of sheeting, shoring and/or bracing only upon approval of appropriate Safety Agencies.

*** END OF SECTION ***

DIVISION 02 – SITEWORK

SECTION 02220

STRUCTURAL EXCAVATION, BACKFILL AND COMPACTION

PART 1 - GENERAL

1.01 DESCRIPTION

A. The Contractor shall excavate, sheet, shore, dewater, backfill and compact all structural excavations necessary for constructing the work under this Contract. The Contractor shall furnish all labor, materials and equipment necessary for completion of the work, all in accordance with these specifications.

B. Related work specified elsewhere:

1. Section 02010: Subsurface Exploration.
2. Section 02151: Sheet piling, Shoring and/or Bracing.
3. Section 02401: Dewatering.
4. Section 02540: Erosion and Sediment Control.

C. Definitions:

1. Excavation: Materials of any kind in the excavation.
2. Excavation below Subgrade: Same as "Excavation" except such excavation is performed below elevations given as subgrade.
3. Subgrade: Subgrade under footings, foundations or slabs shall be as indicated on the Contract Drawings. Where no subgrade is shown, it shall be considered as the planned bottom of footings, foundations or slabs or gravel bedding shown on the Drawings.

1.02 QUALITY ASSURANCE

A. Tests and Inspections:

1. Tests and inspections will be performed by an independent testing agency employed by the Owner. Work of the testing agency includes but is not limited to:
 - a. Inspection of foundation excavations and verification of subgrade suitability.
 - b. Prior approval of material used as fill and backfill.
 - c. Verification of compaction by in-place density tests.

2. Contractor shall provide access for and shall assist testing agency in acquisition of samples and performance of tests involving equipment outside the normal equipment used by the testing agency. Such assistance provided by the Contractor shall be accomplished at no cost to the Owner.
3. Whenever test results indicate compaction densities less than specified, subsequent re-testing occasioned by the initial non-compliance shall be performed by the same testing agency and all costs thereof shall be borne by the Contractor.

B. Reference Standards:

1. American Association of State Highways and Transportation Officials (AASHTO):
 - a. T 180: Method A: Moisture-Density Relationship; Modified Proctor Test.
 - b. T 191: Density by Sand Cone.
 - c. T 224: Coarse Particle Correction.
 - d. T 238: Density by Nuclear Methods.
 - e. T 239: Moisture Content by Nuclear Methods.
 - f. T 272: Method C: Moisture-Density Family of Curves.

1.03 SUBMITTALS

- A. Samples: Submit aggregate samples to the Engineer.
- B. Submit sources of supply for approval by Engineer.

1.04 JOB CONDITIONS

- A. Environmental Requirements:
 1. Do not perform excavating, backfilling or compacting when weather condition or materials are such that, in the opinion of the Engineer, work cannot be performed satisfactorily.
 2. Do not use frozen materials as backfill nor wet materials containing moisture in excess of the amount necessary for satisfactory compaction.
 3. Prior to use, moisten dry backfill material not having sufficient moisture to obtain satisfactory placement or compaction.
 4. Prior to use, dry wet backfill material to a sufficient moisture to obtain satisfactory placement or compaction.
 5. Accommodation of Drainage: Keep sewers, drains and ditches open for surface drainage. No damming or ponding of water in gutters or other waterways will be permitted. Do not direct flow of water across or over pavements except through approved pipes or properly constructed troughs.

Provide pipes or troughs of such sizes and lengths as may be required. Control grading in the vicinity of excavations so the ground surface is properly pitched to prevent water running into excavated areas.

6. Pumping: Dewatering shall be accomplished in accordance with Section 02401 - Dewatering.
7. Control groundwater and surface water during construction in order to maintain soil stability. Maintain the water table elevation sufficiently below the levels of excavation so that slopes will remain stable and bottoms of excavations will not become loosened by flow of water. If the foundation material loses its strength due to improper dewatering techniques, over excavate the material and replace it with Special Backfill at the Contractor's expense.

B. Protection:

1. The Contractor shall, at his own expense, sustain in their places, and protect from direct or indirect injury, all pipes, walls, buildings, and other structures or property in the vicinity of his work, whether above or below ground, or that may appear in the excavation. He shall at all times have a sufficient quantity of timber and plank, chains, ropes, and other material and equipment, on the ground and shall use them as necessary for sheeting his excavations and for sustaining or supporting any structures that are uncovered, undermined, endangered, threatened, or weakened.
 - a. Perform sheeting and shoring in accordance with Section 02151 - SHEETING, SHORING AND/OR BRACING.
2. The Contractor shall take all risks attending the presence or proximity of pipes, poles, wires, walls, buildings, and other structures and property, of every kind and description, in or over his excavation, or in the vicinity of his work, whether above or below the surface of the ground; and he alone shall be responsible for all damages and assure all expense for direct or indirect injury, caused by his work, to any of them, whether such structures are or are not indicated on the Contract Drawings.
3. The Engineer reserves the right under such conditions to stop the excavation or any other part of the work, and to require the Contractor to complete the structure and the backfilling up to such a point as the Engineer, without assuming responsibility for safety to persons or property may require before proceeding further with the excavation; and the Contractor shall not thereby become entitled to demand or to receive any allowance or compensation, other than an extension of the contract time for as many days as the Engineer may determine that the work was delayed by such stoppage.

C. Responsibility for Condition of Excavation: The Contractor shall solely be responsible for the condition and results of excavations made by him. Slides and cave-ins

shall be removed without extra compensation at whatever time and under whatever circumstances they may occur.

PART 2 - PRODUCTS

2.01 MATERIALS

A. General: No right of property in materials is granted the Contractor of excavated materials. This provision does not relieve the Contractor of his responsibility to remove and dispose of surplus excavated material.

B. Gravel/Stone Bedding: Stone or gravel in accordance with the Maryland Department of Transportation Standard Specifications. See Pipe Bedding: 2.01B, Section 02221.

C. Structural Backfill: Suitable soil free of topsoil, plant life, lumber, metal refuse and rock or similar hard objects.

D. Special Backfill: All requirements contained above for Structural Backfill shall apply to Special Backfill.

PART 3 - EXECUTION

3.01 PREPARATION

A. Subgrade Preparation: Areas on which bedding layers are to be placed shall be trimmed and dressed to conform to cross sections shown on the Drawings, within an allowable tolerance of +1 inch from the theoretical slope lines and grades. Where such areas are below the allowable minus tolerance limit, they shall be brought to grade by filling with earth similar to the adjacent material and well compacted or by filling with well compacted bedding material. No additional payment will be made for any material thus required. No bedding shall be placed upon a frozen surface; no snow, ice, or any frozen material shall be incorporated in the bedding. The prepared base shall be inspected immediately prior to placing the bedding, and no material shall be placed thereon until that area has been approved.

3.02 PERFORMANCE

A. Excavation:

1. General:

a. Perform excavation using machinery, except that hand excavation may be required where necessary to protect existing structures or

- buried utilities. No additional compensation will be paid for hand excavation instead of machine excavation as may be necessary from any cause whatsoever.
- b. Perform excavation of every description and of whatever substances encountered to the lines and grades or depths indicated by the Drawings and as specified herein.
 - c. Where work space is limited, remove excavated material from the limited area and replace the material after the structure has been installed. No additional compensation will be made for such removal and replacement.
2. Excavation below Subgrade:
- a. Do not excavate below depths indicated on the Drawings or such depths as required by the Engineer.
 - b. Excavation below depths indicated on the Drawings, through the fault of the Contractor, shall be restored to the indicated or required depths with special backfill at the expense of the Contractor.
 - c. If the foundation for any structure is required by the Engineer to be carried lower than plan subgrade elevation, the voids caused by this excavation shall be backfilled up to plan subgrade elevation with either "Special Backfill" or "Gravel Bedding". Payment for material excavated will be paid for under the appropriate Bid Item in the Bid.

B. Backfilling:

1. General
 - a. Perform backfilling using machinery, except that hand backfilling may be required where necessary to prevent displacing walls, foundations or buried utilities or damage to such. No additional compensation will be paid where backfilling by hand is required.
 - b. After completion of footings and walls and the removal of forms and prior to backfilling, clean excavation free of trash and debris.
2. Gravel Bedding: Where gravel bedding is indicated on the Contract Drawings to be used as a subbase under slabs, footings or foundations, spread backfill uniformly without segregation of coarse and fine material. Thoroughly compact material to the satisfaction of the Engineer with a vibrator compactor. Where more than six inches of aggregate is required, place aggregate in six (6) inch layers and thoroughly compact each layer with a vibratory compactor to the satisfaction of the Engineer.
3. Structural Backfill: Includes all other areas requiring backfill.
 - a. Place backfill in horizontal layers not exceeding eight (8) inches in depth, moistened if required and compact by hand or mechanical tampers to a density of not less than 95 percent of the maximum dry weight density, in accordance with the testing procedures of Modified Proctor Test AASHTO T-180, Method "A".
 - b. No fill or other load shall be placed on or against concrete surfaces

before expiration of the minimum period after placing the concrete, as indicated below, unless otherwise specified.

- (1) Walls and vertical faces 14 days
- (2) Horizontal footings 14 days
- (3) After the minimum period specified above has elapsed, fill operations may be initiated. Within 3 feet (measured horizontally) of walls and vertical or near-vertical faces and within 5 feet (measured vertically) of horizontal footings, no hauling equipment will be permitted and all compaction shall be by approved power tampers. Any damage to structures caused by the Contractor's equipment shall be repaired to the satisfaction of the Engineer without cost to the Owner.

C. Cleanup: Excess excavated material that cannot be used at the project site shall be removed and disposed of off the site in a legal manner at no additional expense to the Owner.

*** END OF SECTION ***

DIVISION 02 – SITEWORK

SECTION 02221

UTILITY EXCAVATION, BACKFILL AND COMPACTION

PART 1 - GENERAL

1.01 DESCRIPTION

A. This work shall consist of all excavation necessary to open the pipe or conduit trench, lay the pipe or conduit, and backfill and compact to the existing or proposed grade as required by the Contract Drawings.

B. Related Work Specified Elsewhere:

1. Section 02010: Subsurface Exploration.
2. Section 02151: Sheet piling, Shoring and/or Bracing.
3. Section 02401: Dewatering.
4. Section 02540: Erosion and Sediment Control.

C. Definitions:

1. All excavation for this Contract is unclassified. Items involved in the excavation such as grassed areas and sidewalks, of whatever material will be considered as unclassified excavation, and no extra payment will be made for removal.
2. Excavation: Removal of materials of any kind in the excavation.
3. Excavation Below Subgrade: Same as excavation except such excavation is performed below elevations given as subgrade.
4. Subgrade: Trench bottom prepared as specified to receive gravel bedding, concrete cradle or concrete encasement or the bottom of excavations prepared to receive pipe line structures.

1.02 QUALITY ASSURANCE

A. Tests and Inspections:

1. Tests and inspections will be performed by an independent testing agency selected and paid by the Contractor. Work of the testing agency includes but is not limited to:
 - a. Prior approval of material used as fill and backfill.
 - b. Verification of compaction by in-place density tests.

- c. Contractor shall provide access for and shall assist testing agency in acquisition of samples and performance of tests.
2. Whenever test results indicate compaction densities less than specified, the Contractor shall correct the installation and retest until satisfactory results are achieved. All costs thereof shall be borne by the Contractor.

B. Reference Standards:

1. American Association of State Highway and Transportation Officials (AASHTO):
 - a. T 180, Method A: Moisture-Density Relationship; Modified Proctor Test.
 - b. T 191: Density By Sand Cone.
 - c. T 224: Coarse Particle Correction.
 - d. T 238: Density By Nuclear Methods.
 - e. T 239: Moisture Content By Nuclear Methods.
 - f. T 272: Method

C: Moisture-Density Family of Curves.

1.03 SUBMITTALS

- A. Samples: Submit aggregate samples to the Engineer.
- B. Submit sources of supply for approval by the Engineer.

1.04 JOB CONDITIONS

A. Environmental Requirements:

1. Do not perform trenching, backfilling or compacting when weather conditions or the condition of materials are such, in the opinion of the Engineer, that work cannot be performed satisfactorily.
2. Do not use frozen materials as backfill nor wet materials containing moisture in excess of the amount necessary for satisfactory compaction.
3. Prior to use, moisten dry backfill material not having sufficient moisture to obtain satisfactory placement or compaction.
4. Prior to use, dry wet backfill material to a sufficient moisture to obtain satisfactory placement or compaction.
5. Plan work so as to provide adequate protection during storms with provisions available at all time for preventing flood damage. Protect installed piping and other work at all times against damage from uplift due to high ground water levels.
6. Accommodation of Drainage: Keep gutters, sewers, drains and ditches open at all times for surface drainage. No damming or ponding or water in gutters or other waterways will be permitted. Do not direct water flows

across or over pavements except through approved pipes or properly constructed troughs. When so required, provide pipes or troughs of such sizes and lengths as may be required, and place the same as required at no expense to the Owner. Perform grading in the vicinity of trenches so that the ground surface is properly pitched to prevent water running into the trenches.

7. Pumping: Dewatering shall be accomplished in accordance with Section 02401 - DEWATERING.

B. Removal of Obstructions:

1. Except for items specifically noted to be removed or relocated, if the position of any pipe, conduit, pole, or other structure above or below ground be such as in the opinion of the Engineer to require its removal, realignment, or change due to work to be done under the Contract, the work of removal, realignment, or change will be done as extra work unless noted as a part of a lump sum item, or will be done by the Owner of the obstructions without cost to the Contractor; but the Contractor shall uncover and support such structures at his own expense before such removal, and before and after such realignment or change as a part of the contract; and the Contractor shall not be entitled to any claim for damage or extra compensation on account of the presence of said structure or on account of any delay in the removal or rearrangement of same.
2. The Contractor shall not interfere with any person, firms, or corporations or with the Owner in protecting, removing, changing, or replacing their pipes, wires, conduits, poles, or other structures; but he shall suffer said persons, firms, or corporation or the Owner to take all such measures as they may deem necessary or advisable for the purpose aforesaid; and the Contractor shall thereby be in no way relieved of any of his responsibilities under the Contract.

C. Protection:

1. Assume all risks attending the presence or proximity of overhead or underground utilities, pipes, conduits, existing structures, and property of whatever nature. Damages and expenses for direct or indirect injury to such structures or to any person or property by reason of them or by reason of injury to them; whether such structures are or are not shown on the Drawings, by work of this Contract, rests solely with the Contractor.
2. Pipe Supports: Adequately support underground pipes or conduits exposed as a result of excavations. Provide adequate support along their entire exposed length by salt treated timber or planking. Install such supports in such manner that backfilling may be performed without dislodging such pipes or conduits. Place and carefully compact material from excavation or Special Backfill, as required, around the supports, and leave such supports in place as a guard against breakage due to backfill settlement. No

additional payment will be due the Contractor for support material left in place nor for the labor of installing and maintaining supports.

D. Excavation Condition:

1. Condition and results of excavation are solely the responsibility of the Contractor. Remove slides and cave-ins at whatever time and under whatever circumstance they occur.

E. Change of Trench Location:

1. In case the Engineer shall direct that the location of a trench be changed to a reasonable extent from that shown on the drawings on account of the presence of an obstruction or from other cause or if a changed location shall be authorized upon the Contractor's request, the Contractor shall not be entitled to extra compensation or to a claim for damage provided that the change is made before the excavation is begun. If, however, such change made at the direction of the Engineer involves the abandonment of excavation already made, such abandoned excavation together with the necessary refill will be classed as miscellaneous excavation and refill. In the event that the trench is abandoned in favor of a new location at the Contractor's request, the abandoned excavation and refill shall be at the Contractor's expense.
2. If an obstruction shall lie within the trench in such manner that the trench has to be excavated to extra width in order that sheeting or bracing may be properly placed or in order that the structure to be placed in the trench may be properly built, such extra width of trench shall be classed as miscellaneous excavation and refill. No sloping of sides of excavations, however, for the presence or absence of obstructions, will be considered as miscellaneous excavation.

F. Trench Work for Electrical:

1. Refer to Division 16 of these Specifications.
2. Requirements specified herein for excavating, backfilling and compacting pipeline trench work shall also apply to such work required for electrical conduit installations.

G. Perform sheeting and shoring in accordance with requirements of Section 02151 - Sheeting, Shoring and/or Bracing. An OSHA approved steel trench box may be considered in lieu of sheeting, shoring, and/or bracing.

H. Perform soil erosion and sediment control work in accordance with details and notes shown on the Drawings and applicable requirements of the Soil Conservation District.

I. If stability of adjoining structures or walls is endangered by excavations, shoring and bracing or underpinning shall be provided as necessary to insure their stability.

J. If it is necessary to place or operate power shovels, trucks or other heavy objects on a level above and near an excavation, the sides of the excavation shall be sheet-piled, shored and braced as necessary to resist the extra pressure due to such superimposed loads.

PART 2 - PRODUCTS

2.01 MATERIALS

A. General: No right of property of material is granted the Contractor of excavated materials prior to backfilling. This provision does not relieve the Contractor of his responsibility to remove and dispose of surplus excavation materials.

B. Pipe Bedding:

1. Pipe bedding shall consist of coarse stone aggregate meeting Maryland Department of Highways and Transportation for No. 57, whose gradation shall be in accordance with the following:

<u>Size Mesh Sieve Size (inches)</u>	<u>Minimum and Maximum Percent Passing by Weight</u>
1-1/2"	100
1"	95-100
1/2"	25-60
No. 4	0-10
No. 8	0-5

C. Trench Backfill:

1. On site excavated soil or soil-rock mixed materials free of topsoil, plant life, lumber, metal, refuse and rock or similar hard objects larger than two inches in any dimension.
2. Backfill material shall contain sufficient moisture for proper compaction and shall be compacted to not less than 95% of the maximum density for any specific soil classification, as determined by the Modified Proctor Test AASHTO T-180, Method "A".

D. Special Backfill:

1. Material for borrow: See 3.02.B.3, Section 02100.

PART 3 - EXECUTION

3.01 PREPARATION

A. Pipe Lines and Grades: Prior to excavation for any run of piping, set control points for line and grade.

1. Control Point: Sufficiently offset control points from trench centerline to prevent loss of points during excavation and pipe laying operations. Make the offset on the trench side opposite the excavated material stockpile.
2. Set the control points 25 feet apart maximum for lines less than 100 feet in length. Set control points at maximum of 100 feet apart or less if required by the Contractor, for lines greater than 100 feet in length, with a minimum of 4 control points.
 - a. In unpaved or unsurfaced areas, place control points on top of hubs driven firmly into the earth. Place a reference stake next to each hub.
 - b. In paved areas, drive spikes or cut crosses into paving; in either case, enclose in a painted circle.
3. Elevations: Taken using a surveyor's level and recorded. Depths of cut to pipeline invert shall be computed and both the stationing and computed depth of cut shall be marked on the stakes and the road surface.
4. Horizontal and Vertical Control: Use either properly calibrated laser or grade stakes and batter boards to maintain vertical and horizontal alignment. Laser operation personnel shall be competent, trained for use with the instrument.
5. Methods used to lay out and maintain lines and grades of pipelines, other than those specified previously, will be permitted; however, such methods will be subject to the approval of the Engineer.

3.02 PERFORMANCE

A. Excavating: Perform excavation and backfilling using machinery except that hand excavation and backfilling may be required where necessary to protect existing structures or utilities and except that backfilling shall be done by hand to the extent hereinafter specified. No claim for extra compensation will be allowed for hand excavation instead of machine excavation as may be necessary from any cause whatever.

1. Excavate trenches to necessary width and depth as required elsewhere herein.
2. Begin excavation in trenches at the control point having the lower invert and proceed upgrade.

B. Bedding Placement: Bedding shall be placed uniformly on the prepared base, in a satisfactory manner, to the lines and grades indicated on the Drawings. Placing of bedding by dumping from top of slope or by other methods that will tend to segregate particle sizes within the bedding will not be permitted. Any damage to the surface of the

bedding base during placing of the bedding shall be repaired before proceeding with the work.

C. Trench Width and Depth:

1. Trench width shall provide suitable room for proper laying and joining of pipes, considering any sheeting or dewatering requirements. Refer to Drawings for Trench Pay Limits to be utilized for Contingent Bid Items.
2. From subgrade elevation to an elevation at least twelve inches above the top of the outside barrel of the pipe, excavate trench banks to vertical lines.
3. From a point twelve inches above the top of the outside barrel of the pipe, keep trench banks as nearly vertical as possible with due regard for safety.

D. Trench Width and Depth for Electrical Work:

1. Refer to Division 16 - Electrical. Excavate trenches for both single and banked conduit runs to vertical lines and to not less than a minimum nor more than a maximum width required to accommodate the conduit or conduits, with due regard for safety.
2. Excavate trenches for both single and banked conduit runs to elevations indicated, and where not indicated, to the depth required to provide the minimum cover specified in Division 16 - Electrical.

E. Length of Open Trench:

1. No greater length of trench in any location shall be left open in advance of the completed structure placed therein than shall be authorized or directed. The Engineer shall be empowered at any time to require the backfilling of open trenches over completed pipeline if in his judgment such action is necessary, and the Contractor shall thereby have no claim for extra compensation even though to accomplish said backfilling, he is compelled temporarily to stop excavation or other work at any place.
2. If work is stopped on any trench for any reason and the excavation is left open for an unreasonable length of time in advance of construction, the Contractor shall if so directed backfill such trench at his own cost and shall not again open said trench until he is ready to complete the structure therein. If the Contractor shall refuse or fail to backfill such trench completely within 48 hours after said notice, the Owner shall be authorized to do the work; and the Owner shall charge the expense thereof to the Contractor and retain the same out of any monies due or to become due him under the contract.

F. Excavation Below Subgrade:

1. The Engineer's written requirement for Excavation Below Subgrade shall entitle the Contractor to reimbursement for the quantities of additional excavation at the unit prices bid for Excavation Below Subgrade.

G. Backfilling:

1. Backfill excavations as rapidly as practicable after completion of construction work therein or after excavations have served their purpose. Unauthorized excavations made by Contractor shall be immediately backfilled at the Contractor's cost. Accomplish backfilling as specified herein and as indicated on drawings.
2. Use material from excavation for backfill unless, in the opinion of the Engineer, such material is not suitable for use as backfill.
3. Unless otherwise indicated or directed, hand place backfill materials in six (6) inch layers to a point at least two (2) feet above pipe crown. Thoroughly compact each layer for the full trench width and under, around and over pipe, using mechanical tampers exerting a pressure of not less than 250 foot pounds per square foot of tamping face.
4. Remainder of trench, more than two feet above pipe crown, may be backfilled by machinery in eight (8) inch layers. Thoroughly compact each layer for the full trench width using mechanical tampers.
5. Upon completion of backfilling in any area under the Contract, the Engineer may require tests to determine the degree of compaction of the backfill material. If the results of tests indicate densities less than specified, the Contractor shall, at his own expense, remedy the condition as directed, in such portions of the trenches as may be required.
6. No puddling of backfill shall be allowed.
7. Do not use frozen backfill materials or place backfill materials on frozen subgrade or trench surfaces.

H. Backfilling Trenches for Electrical Work:

1. Backfill single and banked conduits, using "Trench Backfill" placed in eight (8) inch minimum compacted layers.

I. Cleanup: After trenches and other excavations are refilled and the work completed, remove surplus excavated materials, stone or such other materials from the work in such manner as the Contractor may elect or provide, but subject to the Engineer's approval. Dispose of such materials off the site in a legal manner at no additional expense to the Owner.

1. If the Contractor fails or neglects to do so or to make satisfactory progress in doing so, within twenty-four hours after the receipt of a written notice from the Engineer, the Owner may remove such surplus material and the expense for such work charged to the Contractor and deducted from any monies due or to become due him under the Contract.

*** END OF SECTION ***

DIVISION 02 - SITEWORK

SECTION 02260

FINISH GRADING AND GROUND COVER

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope: Includes spreading of topsoil, fertilizing, seeding, ground cover, and maintenance.

B. Related Work Specified Elsewhere:

1. Section 02100: Site Preparation and Rough Grading

1.02 QUALITY ASSURANCE

A. Source Quality Control: Packaged Products shall indicate the manufacturer's guaranteed analysis on each package and arrive on-site as originally packaged and unopened.

B. Referenced Standards:

1. American Society for Testing and Materials, ASTM C 602, Agricultural Liming Materials.
2. American Association of State Highways and Transportation Officials, AASHTO Emulsified Asphalt.
3. American Standard for Nursery Stock: ASNI Z60.1.

1.03 SUBMITTALS

A. Test Reports: Submit laboratory test reports of the soil analysis and supplement recommendations to the Engineer for approval prior to adding any soil supplements to the topsoil.

1. Laboratory reports shall recommend both grade and application rates of fertilizer and such other soil supplements as required.
2. Take sufficient quantity of topsoil samples to give a representative analysis of on-site topsoil and topsoil from outside sources, if any.

B. Soil Supplement Product Certification: Submit certificates certifying such products to have a guaranteed analysis in conformity with the Engineer approved laboratory soil supplement recommendations report.

C. Seed Certification: Submit certificates or certifying tags indicating lawn seed mixture, seed purity percentage, seed germination percentage and weed seed content percentage to certify conformity with the Specifications.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver packaged products to the site in unopened containers with labels intact and legible.

B. Store packaged products in such a manner to prevent moisture damage and other forms of contamination.

1.05 JOB CONDITIONS

A. Environmental Requirements: Do not perform work of this section when soil or weather conditions are unsuitable. Unsuitable conditions include moisture saturated or frozen in place soil and precipitation of any kind present or occurring during the work.

B. Seeding Dates: The following dates shall govern except when environmental conditions warrant, the Engineer may extend the seeding dates.

1. Spring: 3/1 to 5/15.
2. Fall: 8/15 to 11/15.

C. Existing Conditions: Following performance of related construction and prior to Finish Grading do such debris removal and site leveling as necessary in preparation for Finish Grading. Dispose of such debris legally off-site.

D. Dust Control: Exercise the necessary means and methods to control dust on the site as well as in the off-site work areas where Topsoiling and Finish Grading are required.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Topsoil: Use salvaged material from rough grading as specified previously in Section 02100 - SITE PREPARATION AND ROUGH GRADING.

B. Borrow Topsoil: Use productive topsoils from Contractors source and of a quality meeting the requirements specified above for topsoil.

- C. Water: Water for use may be obtained from Owner, without charge.
- D. Stakes and Guys: Hardwood, pointed.

2.02 SOIL SUPPLEMENT MATERIALS

- A. Agricultural Liming Materials: Products containing calcium and magnesium compounds capable of neutralizing soil acidity and containing not less than 80% of total carbonates. Use liming materials meeting requirements of ASTM Designation C602 and conforming to applicable state liming material regulations.
- B. Peat Moss: Reasonably free from wood substances.
- C. Commercial Fertilizer: See Erosion & Sediment Control Notes Plan Sheet. Free flowing and delivered in unopened containers.

2.03 LAWN AND SEED MATERIALS

- A. Grass Seed: See Erosion & Sediment Control Notes Plan Sheet. Deliver seed in standard containers showing weight, analysis and vendor's name. Provide seed mixed and supplied by an established seed house, certified as to proper purity and germination, and at least 96 percent weed free.
- B. Lawn Mulch: Straw Stalks of any threshed grain or tall hay grass stalks free from seed bearing stalks or roots harmful to lawn growth. Mulch material containing noxious weeds, decomposed material or brittle weed material is not acceptable.
- C. Mulch Binder: Emulsified asphalt conforming to the requirements of AASHTO Grade RS-1 and which does not contain solvents or other diluting agents toxic to plant life.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Prepare subsoil surface for finish grading by dressing and shaping to provide for the uniform placement of topsoil.
- B. Prepare subsoil surface for topsoiling by loosening to a depth of 3 inches and dressing and shaping to provide for the uniform placement of topsoil.

C. Remove surface rock or other foreign objects exceeding 3 inches in greatest dimension. Dispose of such rock and debris in a lawful manner off site.

3.02 PERFORMANCE

A. Placement: Place topsoil over disturbed areas. However, before topsoil placement, construction work in topsoiled areas shall have been completed. Observe precautions as follows:

1. Do not place topsoil over areas indicated to receive paving or walkways.
2. Do not work topsoil while frozen or wet. Do not work topsoil in a dusting condition but moisten same to prevent a dust nuisance.
3. Scarify subsoil to a depth of 2 inches for bonding topsoil with subsoil.
4. On sloped areas, work topsoil into subsoil to blend so as to eliminate any semblance of slip-planing between the two soils; but leave a sufficient cover of topsoil to insure seed germination. Perform such blending of soils by ridging or serrating the subsoil on the slopes.
5. Place topsoil as needed for dressing-up minor depressions due to settling and erosion and to eliminate any other minor irregularities.

B. Finished Elevations and Lines: Grade topsoiled areas of the site to within a tolerance of plus one-tenth of a foot of existing elevations.

1. Grade a uniform longitudinal fall in swales and other surface drainage areas to provide a drainage flow line that can easily be maintained and traversed with normal lawn maintenance equipment.
2. Establish finish grade of topsoil 1/2 to 3/4 inch below top of abutting walks or paving to provide positive drainage of same.
3. Leave finish grade surfaces free of objectionable material, such as lumber, metal, refuse, stone, concrete, paving material, etc. Dispose of such objectionable material in a legal disposal area off site.

C. Compaction: Compact finish grades as the final operation using a light roller weighing not over 120 pounds per foot-width of roller.

D. Tillage: Till finish graded soil over areas indicated for lawn regardless of type of lawn work performed. Use equipment and methods common to such work, and till soil to a two inch depth minimum.

E. Soil Supplement Addition: The soil supplements for lawn areas, as required according to the Engineer approved laboratory test reports may be incorporated into the soil during tillage operations. Assume a minimum of 10 pounds of fertilizer per 1,000 square feet of 10-20-20 fertilizer.

F. Seeding: Sow seed mixtures when air current is low and not more than five days after soil supplements have been applied. Sow seeds in two applications using either

mechanical power seeders or mechanical hand seeders. Sow one-half of the seed mixture in one direction over designated areas and the remainder at right angles to the first sowing. Seeding rates as follows:

1. Grass seed mixture: See Erosion & Sediment Control Notes Plan Sheet.

G. Seed Cover: Imbed seed mixtures into topsoil 1/4 inch to 1/2 inch using a light drag or rake and moving in directions parallel to the contour lines. Immediately after dragging or raking, compact seeded areas using a cultipacker or similar design lawn roller, weighing 60 to 90 pounds per linear foot of roller, and roll at right angles to existing slopes.

3.04 MAINTENANCE AND GUARANTEE

A. Seeded Areas: Keep seed moist continually for proper germination and water thereafter as necessary to prevent drying out or burning. Reseed areas not showing a prompt catch of grass, correct depressions and irregularities and reseed; repeat until a complete coverage is obtained. Contractor shall take all necessary steps to eliminate weed growth in seeded areas.

B. Maintenance period extends from start of planting operations and runs continuously through growing season following initial acceptance of planting. Upon satisfactory completion of final plant replacement, maintenance period shall terminate.

C. During maintenance period, or approximately the 1st and 15th of every month, the Contractor shall provide sufficient supervision of equipment, materials and manpower to:

1. Keep plants in a healthy growing condition by watering when necessary, removing dead or drying branches, removing sprouts, tightening, repairing or replacing guys and wrapping, and maintaining a two (2) inch depth of mulch during maintenance period.
2. Remove dead or damaged plant materials, weed plant beds and plant pits.

D. Remove and replace plants in an impaired, dead, or dying condition following end of first growing season. Replacement materials and methods shall be identical to original. Growing season is defined as beginning March 1st and ending November 15th.

*** END OF SECTION ***

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DIVISION 02 - SITEWORK

SECTION 02401

DEWATERING

PART 1 - GENERAL

1.01 DESCRIPTION

A. The Contractor shall keep all excavations and structures free from water while the construction work is in progress and to such an extent as may be necessary while excavation work is being carried on. He shall provide for the disposal of the water in such a manner as to not impede the normal operation of the facility, nor will the Contractor be permitted to direct any of this water to the existing wastewater treatment plant.

B. The Contractor will be responsible for developing a complete dewatering plan, which protects all areas within the construction site. The Contractor will not be permitted any additional compensation due to the presence of high ground water in his excavation.

C. The Contractor's attention is directed to the fact that the water table in this area is very high.

D. Related Work Specified Elsewhere:

1. Section 02010: Subsurface Exploration
2. Section 02100: Site Preparation and Rough Grading
3. Section 02220: Structural Excavation, Backfill and Compaction
4. Section 02221: Utility Excavation, Backfill and Compaction
5. Section 02540: Erosion and Sediment Control

1.02 PERMITS

A. The Contractor shall be responsible for obtaining necessary permits for dewatering activities.

1.03 SUBMITTALS

A. If dewatering methods are proposed, the Contractor shall prepare a plan of dewatering system and discuss with Owner and Engineer. Review or comments by Owner and Engineer concerning the proposed plan shall not relieve Contractor of his responsibilities for dewatering his excavations in conformance with this Section.

PART 2 - PRODUCTS

(Not used)

PART 3 - EXECUTION

3.01 METHODS

A. Dewatering can be accomplished by ordinary pumping methods, by the use of underdrains or by deep well points. In order to assure continuous dewatering, duplicate units of the selected system incorporated with emergency power should be employed so that a reliable operation may be obtained. It is essential that all excavations be kept dry during construction operations.

3.02 DEWATERING OF WORK AREAS

A. All permanent improvements shall be constructed in areas free from water. The Contractor shall construct and maintain all permanent or temporary slopes, dikes, levees, drainage ditches, sumps, and observation wells necessary for the removal of water from work areas. The Contractor shall design, furnish, install, maintain, and operate all necessary pumping and other dewatering equipment required for dewatering the various work areas and for keeping these and other work areas free from water from any and all sources.

B. All dewatering shall be performed in advance of excavation. The dewatering shall be accomplished in a manner that will prevent loss of fines from the foundation, will maintain stability of all excavated slopes and bottoms of excavations, and will permit all construction operations to be performed in the dry. Dewatering of excavation shall be performed to the extent required to permit placement of compacted fill materials and to prevent sloughing of the excavation side slopes.

3.03 DISPOSAL OF DRAINAGE WATER

A. The disposal of all water from the dewatering and control of water operation and surface drainage shall be accomplished in a manner to have no detrimental effect on any of the new or existing facilities. The method and location of disposal of all water shall be subject to the approval of the Engineer. In addition, no water shall be drained into work built or under construction without prior consent of the Engineer.

*** END OF SECTION ***

DIVISION 02 - SITEWORK

SECTION 02540

EROSION AND SEDIMENT CONTROL

PART 1 - GENERAL

1.01 DESCRIPTION

A. Includes requirements for temporary soil erosion and sediment control at project site.

1.02 GENERAL

A. Provide necessary equipment, labor and supplies for erosion and sediment control throughout project. The work consists of providing necessary measures required for effective control in accordance with the "2011 Maryland Standards and Specifications for Soil Erosion and Sediment Control or current manual". The receipt of a proposal by a bona-fide bidder shall be interpreted to mean the Contractor has familiarized himself with these regulations and rules of procedure and is fully cognizant of exactly what is required.

1.03 EROSION AND SEDIMENT CONTROL PLAN

A. Subject to the extent of the limits of disturbance by the Contractor associated with the Contractor's staging and storage area, erosion and sediment control provisions may or may not be necessary. At the Preconstruction Conference or prior to the start of actual construction, submit for acceptance, proposed limits of disturbance, and schedules for accomplishment of temporary and permanent erosion control work. No work shall be started until the erosion control schedules and methods of operation, if necessary, have been accepted by the Engineer.

1.04 PERMITS

A. At the Contractor's expense, Contractor will be responsible for obtaining approvals from the Somerset County Soil Conservation District for disturbances on-site and outside the site where such work is necessary as a result of construction, including additional requirements deemed necessary by the Soil Conservation District.

*** END OF SECTION ***

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ODIVISION 03 - CONCRETE

SECTION 03100

CONCRETE FORMWORK

PART 1 - GENERAL

1.01 DESCRIPTION

A. The work under this section includes job fabricated forms, form liners, coatings, ties, accessories, and removal of forms.

B. Related Work Specified Elsewhere:

1. Section 03200: Concrete Reinforcement
2. Section 03300: Cast-In-Place Concrete

1.02 QUALITY ASSURANCE

A. Design Criteria:

1. It is the Contractor's responsibility for design, engineering, and construction of formwork.
2. Design formwork in accordance with American Concrete Institute's Recommended Practice for Concrete Formwork ACI 347.
3. Design forms to repeat regularly on regularly repeating structural units or bays. Submit shop drawing covering such forming condition.

B. Allowable Tolerances: Set and maintain concrete forms within tolerance limits stated in American Concrete Institute's Recommended Practice for Concrete Formwork ACI 347.

C. Referenced Standards:

1. American Concrete Institute:
 - a. ACI 347, Recommended Practice for Concrete Formwork.
 - b. ACI 350, Code Requirements for Environmental Engineering Concrete Structures and Commentary.
2. American Plywood Association: APA Grade-Trademarks.
3. U.S. Department of Commerce Product Standards: PS-1 for Construction and Industrial Plywood.

1.03 JOB CONDITIONS

A. Protection:

1. Protect formwork materials before, during and after erection to insure acceptable finished concrete work. Also protect in-place materials and other operations of work in connection with concrete pours.
2. In event of damage to erected forms, make necessary repairs or replacements prior to concrete pours at no expense to the Owner.

PART 2 - PRODUCTS

2.01 FORMS

A. Lumber:

1. Form framing, sheathing, and shoring shall conform to ACI 347.
2. Use lumber free of material defects that would deform the finished concrete product.

B. Plywood:

1. Form Sheathing and Panels: Not less than 5/8 inch thick Exterior Type B-B Plywood Class I and II EXT-APA conforming to U.S. Product Standard PS-1. Plywood forms with metal edges will be acceptable.
2. Use Type II only on surfaces not exposed to view.
3. Provide moldings for chamfers (if any) both milled and planed smooth.

C. Steel: Metal Forms of pre-engineered design may be used in lieu of wood forms.

2.02 FORM TIES AND ACCESSORIES

A. Form Ties:

1. Provide factory fabricated, adjustable-length, removable or snap-off metal form ties conforming to ACI 347 and ACI 350;
2. Use ties in construction of liquid retaining structures that are designed to prevent seepage or flow of water along the embedded item.
3. Use snap-off metal ties with ends that break at least 1½ inch from the face of the wall. Assembly should provide cone shaped depressions in the forms at the surface at least 1 inch in diameter and 1½ inch deep to allow filling and patching.
4. Removable ties that leave holes larger than 1 inch are not permitted.
5. Form ties fabricated on the project site and wire ties or flat bands are not acceptable.

6. Wood spacers are not permitted within the pour.
- B. Metal Accessories:
1. Include spacers, chairs, ties, or other devices for properly assembling, placing, spacing, and supporting the reinforcement in place.
 2. Provide metal accessories with solid plastic feet for exposed slabs and similarly exposed concrete surfaces, both interior and exterior, where accessories come in contact with forms.
 3. Aluminum metal accessories that come in contact with or are embedded in concrete shall be prohibited.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Prior to placement of concrete, inspect forms for cleanliness and accuracy of alignment.

3.02 PREPARATION

- A. Apply form coatings in accordance with manufacturer's specifications.
- B. Do not allow excess form coating material to accumulate in the forms.
- C. Do not allow form coatings to come in contact with construction joints or reinforcing steel.
- D. Caulk and tape butt joints in formwork.

3.03 ERECTION

- A. Construct forms in accordance with ACI 347 to required dimensions, plumb, straight and mortar tight, and paste tight where appearance is important. Securely brace and shore forms to prevent displacement and to safely support imposed concrete load.
- B. Provide temporary openings where interior area of formwork is inaccessible for cleanout, for inspection before concrete placement, and for placement of concrete. Securely brace temporary openings and set tightly to forms to prevent the loss of concrete mortar. Locate temporary openings on forms in as inconspicuous a location as possible.

C. Provide openings in concrete formwork of the correct size and in the proper location to accommodate other operations of construction work in the project. Accurately place and securely support items to be built into forms.

D. Wet forms sufficiently to prevent joints in wood forms from opening prior to concrete pour.

3.04 FORM REMOVAL (ACI 347)

A. After concrete has been placed, forms, bracing and supports shall remain undisturbed long enough to allow the concrete to reach the strength necessary to support with safety its own weight plus any live load and earth pressure that might be placed upon it without causing excessive settlement or deflection or any temporary or permanent damage to the structure.

B. Where in his opinion, the leaving in place of forms contributes to the permanent benefit of the structure, the Engineer may order the forms to remain for a longer period than that considered to be sufficient time in the judgment of the Subcontractor.

C. However, should the Engineer acquiesce in the removal of forms by the Subcontractor, the Engineer assumes no responsibility as a result of their removal.

D. The Subcontractor is fully and personally responsible and is in no manner relieved of this responsibility for such removal.

E. Take special care to prevent the breaking of edges and corners of concrete in the stripping of forms.

F. Hammer-pack holes left by tie rods with stiff mortar of the same materials as, but somewhat leaner than, that in the concrete. Render the patch inconspicuous.

*** END OF SECTION ***

DIVISION 03 - CONCRETE
SECTION 03200
CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Fabrication and placement of concrete reinforcing materials.

1.02 REFERENCES

A. ASTM A82: Specification for Steel Wire, Plain for Concrete Reinforcement.

B. ASTM A185: Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.

C. ASTM A615: Specification for Deformed and Plain Billet - Steel Bars for Concrete Reinforcement.

D. CRSI: Manual of Standard Practice.

1.03 SUBMITTALS

A. Shop Drawings.

1. Submit drawings showing layout and details of reinforcing.
2. Use figured dimensions only, scaling drawings not permitted.
3. Review of shop drawings is limited to design intent only. No responsibility for a detailed check of member length, size, spacing, or similar detail information is assumed by virtue of such review.

B. Affidavit.

1. Furnish an affidavit, in duplicate, from the steel manufacturer that steel manufactured for this project meets the requirements of these specifications.

1.04 DELIVERY, HANDLING AND STORAGE

A. Deliver materials bundled, tagged, and marked.

B. Store at the site to prevent damage and accumulation of dirt or excessive rust.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Deformed Reinforcing Bars: New billet steel, ASTM A615, Grade 60. Stirrups and ties shall be Grade 40.
- B. Welded Wire Fabric Reinforcing: ASTM A185.
- C. Metal Accessories: Include spacers, chairs, ties, or other devices for properly assembling, placing, spacing and supporting reinforcement in place. Provide metal accessories for exposed slabs and similarly exposed concrete surfaces, both interior and exterior, with solid plastic feet where accessories come in contact with forms. Provide chairs for reinforcing for slabs and beams on earth with metal pads attached to the feet to prevent penetration of the earth form.
- D. Tie Wire: Steel ASTM A82.

2.02 FABRICATION

- A. Fabricate to conform to required shapes and dimensions. Comply with CRSI "Manual of Standard Practice".

PART 3 - EXECUTION

3.01 PLACING

- A. Place reinforcement accurately in strict accord with plans and CRSI Manual for Placing Reinforcing Bars.
- B. Support and tie in a way which will prevent displacement while concrete is being placed.
- C. Note requirements for earth forms and exposed concrete.
- D. Remove loose rust and mill scale, earth and other materials which reduce or destroy bond with concrete.
- E. Install wire fabric in as long lengths as practicable. Lap adjoining pieces at least one full mesh and lace splices with 16 gauge wire.

*** END OF SECTION**

DIVISION 03 - CONCRETE

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 DESCRIPTION

- A. The work under this section shall include cast-in-place concrete.
- B. Related Work Specified Elsewhere:
 - 1. Section 01300: Submittals
 - 2. Section 01700: Contract Closeout
 - 3. Section 03100: Concrete Formwork
 - 4. Section 03200: Concrete Reinforcement
 - 5. Section 03600: Grout
 - 6. Section 05500: Metal Fabrications

1.02 QUALITY ASSURANCE

- A. Standards: Conform to the requirements of the American Concrete Institute (ACI) and the American Society for Testing and Material (ASTM) or as hereinafter specified, whichever is the more stringent. Comply with applicable provisions of the latest editions of referenced specifications.
- B. Testing Agency: Employed and paid by the Contractor.
- C. Concrete Testing: The Contractor shall provide the Testing Agency with access to the concrete used. The Testing Agency shall be responsible for all testing of concrete.
- D. Leak Testing: Any concrete structure that is designed to contain water, and is constructed as a part of the work outlined within this Contract shall undergo leak testing as outlined herein.

1.03 SUBMITTALS

- A. List of materials and manufacturers for review.
- B. Design Mixes: Submit design mixes for classes of concrete to be used on the project for review prior to placing concrete. Each design mix shall indicate the proposed

use within the structure (i.e., floor slabs, footings, tanks, etc.). Approval of the design mix and/or acceptance of the test report does not in any way relieve the Contractor of his responsibility to insure that the strength, slump and quality of the in-place concrete meets the requirements of the Contract Documents.

1. Proportioning (ACI 211.1, ACI 304, ACI 318): Determination of strength and quality of the concrete proposed for use is the responsibility of the Contractor, established by tests made in advance of the beginning of operations, using the consistencies most suitable for the work. Unless otherwise specified, provide concrete composed of cement, fine and coarse aggregate admixture(s), and water. The exact division of the total aggregate shall be such as to produce a concrete of the greatest workability and density.
2. Strength: Minimum ultimate compressive strength at the end of 28 days shall be as outlined below, and seven day tests not less than 70 percent of 28-day tests.

Structural	4,000 PSI
Sidewalk	3,000 PSI
Misc. Concrete	4,000 PSI

1.04 JOB CONDITIONS

A. Environmental:

1. Depositing Concrete in Cold Weather (ACI 306):
 - a. Place concrete only when temperature is at least 35°F and rising. Stop concrete placement in time to allow slab to be completely finished and covered before temperature drops below 35°F.
 - b. Do not add salt, chemicals or other non-freezing materials to concrete. Do not use frozen materials or materials containing ice.
 - c. When depositing concrete at a temperature of less than 40°F, the concrete shall have a temperature of at least 60°F, but not more than 70°F for not less than 5 days after placing. When necessary, heat concrete materials before mixing. Method of heating materials and protecting concrete is subject to outside temperature at a rate not faster than one degree per hour for first day and two degrees per hour thereafter, until outside temperature is reached.

B. Concrete Encasement Of Pipes: Encase pipes under structures or buildings (indicated by the drawings to be encased in concrete) for the full length of the pipe run under the structure.

C. Concrete Encasement of Conduits: Encase conduit runs as indicated and detailed on the Drawings as work of Division 16 - ELECTRICAL. Concrete Class as specified in Division 16 - ELECTRICAL.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Cement:

1. Portland Cement: ASTM C 150 Type I/II
 - a. Total Alkalis < .6%
 - b. C₃A < 7% (ASTM C 150)
2. Use of fly ash or GGBFS is recommended for durability when in direct contact with sewage or sewage influent.
3. Only one brand and manufacturer of approved cement shall be used for exposed concrete.

B. Aggregates: ASTM C 33, ACI 304, 211.1.:

1. Fine Aggregate: Natural sand. Free of loam, clay, or foreign matter.
2. Coarse Aggregate: Free of loam, clay, or foreign matter. Crushed stone or gravel, hard, durable pieces, free from adherent coatings. Maximum size ASTM C33, size 57.
3. Coarse Aggregate for Toppings, Slabs and Fills 3 Inches and Less in Thickness: Pea gravel 1/2 inch maximum size.

C. Water: Potable.

D. Admixtures:

1. Water Reducing Admixture: ASTM C 494, Type A (Chloride free). One of the following or approved substitute.
 - a. "Plastocrete 161" by Sika Chemical; Corporation, Rockville, Maryland.
2. Air-Entraining Admixture: ASTM C 260. One of the following or approved substitute.
 - a. "Sika-AER" by Sika Chemical Corporation, Lyndhurst, NJ 07071.
3. Accelerator/Retarder may be used only if design mixes utilizing the accelerator/retarder are submitted and accepted.
4. Do not use calcium chloride.

E. Preformed Expansion Joint Fillers:

1. Bituminous Type: ASTM D 994.
2. Non-extruding and Resilient Bituminous Types: ASTM D 1751.

F. Waterstops:

1. 6" x 3/8" flat dumbbell waterstop as manufactured by Paul Murphy Plastics Company, Roseville, MI, or approved equal. Provide with "T", "L", "Cross", and "Transition" Junction sections, and other fittings as required by conditions.

G. Epoxy Adhesive for Embedding Reinforcing Steel: HILTI HY150.

H. Curing Materials: Use curing materials that will not stain or affect concrete finish or lessen the concrete strength and comply with the following requirements:

1. Burlap: Use materials conforming to AASHTO M 182.
2. Sheet Materials: Use material conforming to ASTM C 171.
3. Liquid Membrane-Forming Compounds: ASTM C 309, Type 1, free of wax or other adhesive bond breaking ingredients, such as Master Builders MASTERSEAL 66, or equal.

I. Anchor Slots: Dovetail type, 22 gauge galvanized steel, foam lined, Heckman Type 100 or equal with 1" wide back by 1" deep with 5/8" throat and spaced 1'-4" on center vertically.

2.02 PROPORTIONING CONCRETE (ACI 211.1; ACI 304; ACI 318; ACI 301)

A. Determination of strength quality of the concrete proposed for use is the responsibility of the Contractor, established by tests made in advance of the beginning of the operations, using the consistencies most suitable for the work.

B. Unless otherwise specified, provide concrete composed of cement, fine and coarse aggregate, and water.

C. The exact division of the total aggregate shall be such as to produce a concrete of the greatest workability and density.

D. Contents:

1. Cement: Concrete with $f'c = 4,000$ psi shall have a minimum of six and one-half (6-1/2) bags of cement per cubic yard.
2. Aggregates:
 - a. Use amounts of aggregates necessary to produce a dense workable mixture.
 - b. Coarse aggregate size as specified for intended use.
3. Water:
 - a. Quantity of water to be the minimum required to attain required slumps.
 - b. Water/cement ratio not to exceed 0.45.

- c. Concrete exposed to weather shall be made with not more than five (5) gallons of water per bag of cement, including the free moisture in the aggregates.

2.03 MIXING CONCRETE

A. "Ready-Mixed" Concrete:

1. (ASTM C 94 and ACI 304) Certified by the supplier as to mix and strength.
2. Delivery tickets shall state strength, slump, yards, quantities of cement, aggregate and admix, if the latter is used.
3. Maintain a readily available file of tickets covering all concrete used at the site.

B. Mix concrete only as required and do not use concrete that has been mixed so long that the initial set of the concrete, as determined by tests, occurs sooner than 15 minutes after placement.

C. Discharge concrete, transported in a truck mixer, into forms within 1-1/2 hours after the cement has been added to water and aggregate.

D. Admixtures:

1. Provide plasticizer admixture for concrete except footings in accordance with manufacturer's recommendations, based on the temperature at the site at the time of placement.
2. Vary quantities of plasticizer in order that slump and water and cement content of the mix remain constant for all temperatures.
3. Provide 4 ounces of plasticizer per bag of cement for concrete used to fill masonry walls.

E. Air Entrainment: All concrete shall have air entrainment of not less than 5 percent nor more than 7 percent, certified by the supplier.

F. Strength:

1. Provide the minimum ultimate compressive strength at the end of 28 days as noted hereinbefore.
2. Seven day tests shall be not less than 70 percent of 28 day tests.

G. Slump: ACI 211.1 3-1/2 inch maximum slump.

PART 3 - EXECUTION

3.01 INSPECTION

A. Work to receive cast-in-place concrete shall be inspected for deficiencies which would prevent proper execution of the finished work. Do not proceed with placing until such deficiencies are corrected.

B. The preparation of forms; placing of reinforcing steel, conduits and sleeves; batching; mixing; placing; and curing of concrete will be subject at all times to the inspection by the Engineer.

3.02 JOINTS AND EMBEDDED ITEMS

A. Construction Joints:

1. Place construction joints where indicated on the Drawings or as required. Where not shown, the Contractor is responsible for determining the location of construction joints.
2. Secure Engineer's written approval prior to making additional or revised locations of construction joints.

B. Bond new concrete with hardened concrete as follows:

1. Roughen and clean hardened concrete of foreign matter and laitance and saturate with water.
2. Cover the hardened concrete with a three inch layer of grout. Use grout of same material composition and proportions of concrete being poured except coarse aggregate omitted.
3. Place new concrete on grout before it has attained its initial set.
4. Other bonding methods must be approved by Engineer.

C. When concreting is to be discontinued for more than forty-five (45) minutes and if the construction is to be horizontal, install keyways and embed dowel bars in the concrete before initial hardening. Use keyways and dowels in vertical concrete construction only when indicated or directed by the Engineer.

D. Other Embedded Items: Place sleeves, inserts, anchors, and embedded items required for adjoining work prior to concreting. Place accurately, and support against displacement.

3.03 PRODUCT OF CONCRETE

A. Ready-Mixed Concrete:

1. Batched, mixed, and transported in accordance with ASTM C94.

2. Plant equipment and facilities shall conform to the Check List for Certification of Ready Mixed Concrete Production Facilities of the National Ready Mixed Concrete Association.

3.04 PLACING

- A. General: Conduct placement work in accordance with ACI 304.
- B. Preparation:
 1. Prepare formwork in advance and remove snow, ice, water, and debris from within forms.
 2. Pre-position expansion joint material, anchors, and embedded items.
 3. Sprinkle subgrades sufficiently to eliminate water loss from concrete.
- C. Conveying:
 1. Handle concrete from mixer to final deposit rapidly by methods which will prevent segregation or loss of ingredients to maintain required quality of concrete.
 2. Do not convey concrete through aluminum or aluminum alloy.
 3. Do not place concrete by pumps or other similar devices without prior written approval of Engineer.
- D. Depositing:
 1. Do not allow concrete to drop vertically more than 4 feet. Use elephant trunks for depths of more than 4 feet.
 2. Deposit in approximately horizontal layers of 12 to 18 inches.
 3. Do not allow concrete to flow laterally more than 3 feet.
 4. Make placement within sections continuously to produce monolithic unit.
 5. Carry on placing at such a rate that concrete which is being integrated with fresh concrete is still plastic.
 6. Do not deposit concrete on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness within sections.
 7. Do not use concrete which has partially hardened or has been contaminated by foreign materials.
 8. Do not begin placing of concrete in beams or slabs until concrete previously placed in walls or columns has attained initial set.
 9. Do not subject concrete to procedures which will cause segregation.
 10. Do not bend reinforcement out of position when placing concrete.
 11. Do not place concrete in forms containing standing water.
- E. Consolidation:

1. Consolidate concrete by vibration, spading, rodding, or other manual methods. Work concrete around reinforcement, embedded items and into corners: eliminate all air or stone pockets and other causes of honeycombing, pitting on planes of weakness.
2. Use vibration equipment of internal type and not the type attached to forms and reinforcement.
3. Use vibrators capable of transmitting vibration to concrete in frequencies sufficient to provide satisfactory consolidation.
4. Do not leave vibrators in one spot long enough to cause segregation. Remove concrete segregated by vibrator operation.
5. Do not use vibrators to spread concrete.
6. Have sufficient reserve vibration equipment to guard against shutdown of work occasioned by failure of equipment in operation.

F. Cold Weather Concreting:

1. Temperature of concrete delivered at the job site shall conform to the following temperature limitations:

Air temperature Deg. F	Minimum Concrete Temperature, Deg. F	
	For sections with least dimension less than 12 in.	For sections with least dimension 12 in. or greater
30 to 45	60	50
0 to 30	65	55

2. If water or aggregate is heated above 100°F., combine water with aggregate in the mixer before cement is added. Do not mix cement with water or with mixtures of water and aggregate having a temperature greater than 100°F.
3. Provide equipment for heating concrete materials and protecting concrete during freezing or near-freezing weather. Do not use foreign materials or materials containing snow or ice.
4. Surfaces which the concrete is to come in contact with must be free of frost, snow, and ice.
5. Concrete placed in forms shall have a temperature of 50°F or higher after placement. Maintain this temperature a minimum of 5 days. Provide additional time if necessary for proper curing.
6. Housing, covering, or other protection used in curing shall remain intact at least 24 hours after artificial heating is discontinued. Do not place dependence on salt or other chemicals for the prevention of freezing.
7. Perform cold weather concreting work in accordance with ACI306.

G. Hot Weather Concreting:

1. Temperature of concrete delivered at the job site shall not exceed 90°F.
2. Cool ingredients before mixing to prevent temperature in excess of 90°F.
3. Make provisions for windbreaks, shading, fog spraying, sprinkling or wet cover when necessary.
4. Perform hot weather concreting work in accordance with ACI 305.

3.05 FINISHING

A. Finishes: Finish exposed concrete surfaces true and even, free from open or rough areas, depressions, or projections. Bring concrete up in vertical pours to the required elevation, strike-off with a straight edge and float-finish.

1. Floated Finish: After concrete has been placed, consolidated, struck off and leveled, do not work further until ready for floating. Begin floating when water sheen has disappeared and when the surface has stiffened sufficiently to permit the operation.
2. Smooth Rubbed Finish: Obtained by rubbing a vertical surface not later than one day after form removal. Wet surface and rub with carborundum brick or other abrasive until uniform color and texture are produced. Do not use cement grout other than the cement paste drawn from the concrete itself by the rubbing process.
3. Steel Trowel Finish: Obtained troweling after power floating shall produce a smooth surface which is relatively free of defects but which may still show some trowel marks. Perform additional trowelings by hand after the surface has hardened sufficiently. Perform final troweling when a ringing sound is produced as the trowel is moved over the surface. Thoroughly consolidate surface by hand trowel operations. Produce finished surface essentially free of trowel marks, uniform in texture and appearance, with true planes within 1/8 inch in 10 ft., as determined by a 10 ft. straightedge placed anywhere on the slab in any direction.
4. Broom or Belt Finish: Immediately after concrete has received a Floated Finish, give surface a coarse transverse scored texture by drawing a broom or burlap belt across the surface.

B. Finish Schedule:

1. Exterior of concrete structures shall receive a smooth rubbed finish. Includes exterior of all tanks and building walls to at least one foot below finished grade.
2. Interior of concrete structures shall receive a smooth rubbed finish. Includes interior of all tanks and building walls.
3. Floors intended as walking surfaces or for reception of floor coverings and tank floors shall receive a steel trowel finish.

4. Exterior concrete walks, steps and platforms shall receive a broom or belt finish.

C. Chamfer all exposed (horizontal and vertical) concrete edges 3/4 inch. Exposed vertical concrete edges shall also be chamfered to at least one foot below finished grade.

3.06 CLEANING AND PATCHING

A. After forms have been removed and concrete surfaces observed, patch bad joints, voids, stone pockets or other defective areas.

1. Chip away defective areas to a depth of not less than one inch with the edges perpendicular to the surface.
2. Wet area to be patched and a space at least 6 inches wide entirely surrounding it to prevent absorption of water from patching mortar.
3. Brush into surface a grout of equal parts of Portland cement and sand with sufficient water to produce a brushing consistency, follow immediately with patching mortar.
4. Make patch of same material and of same proportions as used for the concrete, except omit coarse aggregate.
5. Amount of mixing water as little as consistent with requirement of handling and placing.
6. Retemper mortar without addition of water by allowing it to stand for a period of one hour during which time, mix with trowel to prevent settling.
7. Thoroughly compact the mortar into place and screen off as to leave the patch slightly higher than the surrounding surface. Leave undisturbed for a period of one to two hours to permit initial shrinkage before final finishing.
8. Finish patch in such manner as to match adjoining surfaces.

B. In addition to patching defective areas and filling the holes, carefully remove all fins and other projections and level offsets.

3.07 CURING AND PROTECTION

A. General: Immediately after placement, protect concrete from premature drying, excessive hot or cold temperatures and mechanical injury. Curing shall be by either water curing or sealing methods in accordance with ACI 308. Cure concrete continuously for a minimum of 7 days at ambient temperatures above 40°F.

B. Hot Weather Curing: Set Hot Weather Concreting this Section.

C. Cold Weather Curing: See Cold Weather Concreting this Section.

D. Application Rate of Liquid Membrane-Forming Compounds: Compound shall restrict the loss of water to not more than 0.055 g/cm² of surface in 72 hours when tested in accordance with ASTM C 156.

E. Do not use liquid curing compounds over floor surfaces that are to receive a liquid hardener applied to dry concrete.

3.08 FIELD QUALITY CONTROL

A. General: The Contractor will engage the services of a testing laboratory to test the basic mixtures of concrete.

B. Cylinder Tests: During concrete placement, tests will be made by a laboratory employed by the Contractor to verify the concrete properties, and to ascertain the proportions of water, cement, and fine and coarse aggregates.

1. Sets of four field control cylinder specimens will be taken at random during progress of the work, in conformity with ASTM C 31.
2. Total number of specimens taken on the project may average one set per 50 cubic yards, and in general not less than one set of specimens taken on any one day.
3. Four cylinders shall be laboratory cured. If any such tests fail to meet the requirements or if there is any unreasonable variation in the quality of the materials, concreting shall be stopped. Faulty concrete shall be removed and necessary adjustments in the mix shall be made as required, at the Contractor expense, to produce a concrete meeting the following requirements:
 - a. When average ultimate 28-day strengths of control cylinders in any set falls below the required ultimate strength or below proportional minimum 7-day strengths where proper relation between 7 and 28-day strengths have been established by tests, the proportions, water content, or temperature conditions shall be changed as required, at the Contractor expense, to secure the required strength.
4. The Contractor shall cooperate in the making of such tests to the extent of allowing free access to the work for the selection of samples, providing the following:
 - a. Heated moist storage facilities for specimens.
 - b. Providing protection for specimens against injury or loss.
 - c. Providing material, equipment and labor required for the purpose of taking concrete cylinder samples.

C. Slump Tests: Made in the field by the testing laboratory.

1. Slump tests made for each strength test and whenever consistency of concrete appears to vary in accordance with ASTM C 143.

D. Core Tests: When tests on control specimens of concrete fall below the required 28-day compressive strength, the Engineer may permit check tests for strengths to be made by means of typical cores drilled from the structure in accordance with ASTM C 42 and C 39.

1. Work involved obtaining core samples and the cost of shipping and delivering them to a laboratory approved by the Engineer shall be at the Contractor's expense.
2. The Engineer may have cores taken from any questionable area in the concrete work such as at construction joints and at other locations as required for determination of concrete quality.
3. Should the strength of the test cores fall below the required minimum 28-day compressive strength, the concrete shall be rejected and shall be removed, disposed of off the plant site, and replaced. No payment will be made for installing, testing and removal of defective concrete.

E. Leak Tests: After concrete used in concrete tank structures is proven to achieve or exceed its 28-day compressive strength, the Contractor shall fill the structure with water (provided by the Owner) to the tank's maximum water surface elevation. After the tank is full, the Contractor shall float a bucket or tub in the water, and tether the bucket or tub to the side of the tank structure for comparative measurements accommodating for rain and evaporation. A baseline measurement shall be taken at the start of the test, measuring the water level in the structure, and the tub/bucket. After 24-hours, the water level should be measured again. The difference, less the difference in the tub/bucket shall be considered the leakage from the tank structure. Measurements demonstrating greater than 1/4" of leakage from the tank structure constitute a failing test. The Contractor shall then be responsible for remedying any leaks at no additional expense to the Owner and shall retest until a passing test is achieved. The Contractor shall submit any leak repair means and methods to the Engineer for review.

*** END OF SECTION ***

DIVISION 03 - CONCRETE

SECTION 03600

GROUT

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Provide grout where indicated on the Drawings.
- B. Individual grouting requirements as specified in various other sections of these Specifications.

1.02 QUALITY ASSURANCE

- A. Reference Standards:
 - 1. American Concrete Institute: ACI 308, Recommended Practice for Curing Concrete.
 - 2. American Society for Testing and Materials:
 - a. ASTM C 33, Concrete Aggregates.
 - b. ASTM C 150, Portland Cement.
 - c. ASTM C 109, Compressive Strength of Hydraulic Cement Mortars, Test.

1.03 SUBMITTALS

- A. Submit design mixes or product data in accordance with Section 01300 - SUBMITTALS.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Prevent moisture damage and contamination of materials.
- B. Store materials in undamaged condition with seals and labels intact as packaged by the manufacturer.

1.05 JOB CONDITIONS

- A. Protect against high and low temperatures and bad weather in accordance with American Concrete Institute standards for placement of concrete.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Grout (Sand/Cement):

1. Portland Cement: ASTM C 150 Type II. (I Norm., II Sulfate R., III High Early.)
2. Sand: ASTM C 33, fine aggregate.

B. Water: Potable quality, free from deleterious amounts of acids, alkalis, and organic substances.

C. Non-Shrink, Non-Metallic Grout: Factory premixed material containing no corrosive irons, aluminums, chemicals or gypsums.

1. Acceptable Manufacturers: Sika, Sika Grout 212; or equal.

2.02 GROUT QUALITY

A. Grout (Sand/Cement): Mixture of Portland Cement, fine aggregate and water in the same proportions used in cast-in-place concrete with coarse aggregate omitted.

B. Non-Shrink Grout: Use ready-mix type requiring only the addition of water. Do not add other materials. Water requirement proportions shall conform to manufacturer's specifications for the desired mix consistency.

C. Dry-Packed Grout (For Foundation Underpinnings): Mixture of Portland cement, fine aggregate, and water with a low water/cement ratio. The grout is to be hand tamped into place to ensure all voids are filled.

PART 3 - EXECUTION

3.01 PREPARATION

A. Forming:

1. Use forming procedures that allow proper and complete placement of grout.
2. Anchor support elements so no movement is possible.
3. Remove supports only after grout has hardened.
4. Pre-treat with forming oils wood forms that may absorb moisture.

B. Preparation of Surface:

1. Grout (Sand/Cement): Clean areas to be grouted free of oil, grease, laitance, dirt and other contaminants. Remove loose material. Remove rust, paint and oil from metal components in contact with grout.
2. Non-Shrink Grout: Prepare in accordance with manufacturer's printed instructions.

3.02 MIXING

A. Equipment: Use power operated mechanical mortar mixer.

B. Time:

1. Grout (Sand/Cement): In accordance with requirements for cast-in-place concrete.
2. Non-Shrink Grout: In accordance with manufacturer's printed instructions.

3.03 PLACING

A. Grout (Sand/Cement): Place and cure grout as follows:

1. Following surface preparation, saturate the concrete with water; then remove excess water and brush on a coat of neat cement. Place grout while neat cement is wet.
2. Place in a single pour. Straight-edge exposed grout surface for trueness; consolidate and finish with a steel trowel.
3. Cure and seal in accordance with ACI 308.
4. After curing, fill scored joints with joint sealer.

B. Non-Shrink, Non-Metallic Grout: Perform grout placement in accordance with the recommendations of ACI and the manufacturer's published specifications for mixing and placing. Place non-shrink, non-metallic grout only where indicated on the Drawings.

*** END OF SECTION ***

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DIVISION 05 - METALS

SECTION 05120

STRUCTURAL STEEL

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Anchor bolts, beams, columns, bearing plates, connections, shop painting.
- B. Erection, field welding and painting.

1.02 RELATED SECTIONS

- A. Section 04100: Mortars
- B. Section 14300: Hoists & Cranes

1.03 REFERENCES

- A. AISC: Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings.
- B. AISC: Code of Standard Practice.
- C. AWS: Structural Welding Code.
- D. ASTM A 36: Specification for Structural Steel.
- E. ASTM A 53: Specification for Pipe, Steel, Black and Hot Dipped, Zinc Coated Welded and Seamless.
- F. ASTM A 307: Specification for Carbon Steel Bolts and Studs.
- G. ASTM A 325: Specification for High Strength Bolts for Structural Steel Joints.
- H. ASTM B221 Aluminum Alloy Extruded Bars, Rods, Shapes and Tubes.
- I. ASTM A386 Zinc Coated (Hot Dip) on Assembled Steel Products.
- J. ASTM A36: Specification for Steel Plates.

1.04 SUBMITTALS

- A. Shop and erection drawing for review.
- B. Shop coat paint type and manufacturer.
- C. Furnish an affidavit, in duplicate, from steel manufacturer that steel manufactured for this project meets requirements of these specifications.
- D. Submit certified reports from supplier that steel as fabricated meets requirements of the Project Manual.

1.05 QUALITY ASSURANCE

- A. Welders: Certified and qualified in accord with requirements of AWS for the materials and methods being used.
- B. It is the responsibility of supplier to insure, through his own quality control, that material shipped to site meets requirements of Project Manual. If defects in materials or workmanship are found, repair or replace as required to meet specifications at no increase in contract price.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Structural Steel: ASTM A992, 50 ksi yield stress, w-shapes.
- B. Structural Steel: ASTM A500, Grade B, HSS steel.
- C. Structural Steel: ASTM A36, 36ksi yield stress, miscellaneous steel.
- D. Anchor Bolts: ASTM F1554-07a, 36ksi, yield strength, non-headed type, unless indicated otherwise.
- E. Unfinished Threaded Fasteners: ASTM A 307, Grade A, regular low carbon steel. Hex heads and nuts.
- F. Steel Pipe: ASTM A 53, Type E or S, Grade B.
- G. Primer Paint: Fabricator's standard.

H. High Strength Threaded Fasteners: Hex head bolt, hex nuts and hardened washers, ASTM A 325.

I. Welding: Electrodes, welding machines, etc. compatible with type of steel being welded.

J. Grout: See Section GROUT.

K. Galvanizing: ASTM A386.

2.02 FABRICATION

A. Provide pieces with erection connections. Connections as shown on the drawings, or as approved. Weld or bolt shop connections.

B. Provide holes for the attachment and passage of the work of other trades.

C. At Contractor's option, seat angle bolts or other approved erection systems may be used, subject to approval.

D. Use high strength fasteners for principle bolted connections. Use unfinished fasteners for the bolted connections of secondary framing members to primary members.

E. Welding: Comply with AWS code for procedures, appearance and quality of welds.

F. Provide stainless steel fasteners in connection with aluminum items.

2.03 SHOP PAINTING

A. Thoroughly clean steel work of loose scale, rust, oil, and dirt, and paint one shop coat approved rust inhibitive primer at a rate to provide a dry film thickness of 2 mils.

B. Paint on dry surfaces only. Unless protected, do not execute in wet, damp, or freezing weather.

C. Thoroughly work paint into joints and open spaces.

D. Paint parts inaccessible after assembly or erection two coats. Do not paint surfaces to be welded in contact.

E. Do not paint welds until after they have been inspected and approved.

PART 3 - EXECUTION

3.01 ERECTION

- A. Comply with the AISC Specifications and Code of Standard Practice.
- B. Introduce temporary bracing and shoring as required. Remove when permanent members are in place and final connections are made.
- C. Set bearing plates on grout.
- D. After the work has been erected and connected, touch up where paint has been rubbed off and paint field welds, using paint specified for shop coat.

*** END OF SECTION ***

DIVISION 05 - METALS

SECTION 05500

METAL FABRICATIONS

PART 1 - GENERAL

1.01 DESCRIPTION

A. The work in this section shall include bar screen fabrication, stairs, platforms, grating support and other miscellaneous metal items fabricated from steel and aluminum not covered in other sections.

B. Related Work Specified Elsewhere:

1. Section 01300: Submittals
2. Division 03: Concrete
3. Section 05510: Aluminum Railings and Stairs
4. Division 11: Equipment

1.02 REFERENCES

A. AISC: Specification for the design, fabrication, and erection of structural steel for buildings.

B. AISC: Code of standard practice.

C. AWS: Structural welding code.

D. Aluminum Association: Specifications for aluminum structures.

E. ASTM B221 aluminum alloy extruded bars, rods, shapes and tubes.

F. ASTM A36: Specification for Structural Steel.

G. ASTM A307: Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.

1.03 QUALITY ASSURANCE

A. Standards: Comply with latest edition of applicable provisions of the referenced standards.

1.04 SUBMITTALS

- A. Submit shop drawings for review in accordance with Section 01300 - SUBMITTALS.
- B. Furnish manufacturer's name and type of shop paint.
- C. Submit sealed design calculations for aluminum walkways, platforms and stairs. Calculations shall be based on applicable building and safety codes. Calculations shall include member sizes, deflections, connections, lateral stability, etc. Design calculations shall be sealed by a professional engineer registered in Maryland. Platforms shall be designed for a 100 psf uniform live load or 2,000 pound concentrated live load.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Plates, Shapes, Bars: ASTM A 36, steel.
- B. Anchor Bolts: ASTM A307 steel.
- C. Pipe: ASTM A 53, Schedule 40, black.
- D. Aluminum Extrusions: ASTM B221, Alloy 6063-T6.
- E. Aluminum Structural Shapes And Plates: ASTM B209, Alloy 6061-T6.
- F. Shop Paint: See Section 09900 – PAINTING - PROCESS EQUIPMENT AND TANKS.

2.02 FABRICATION, GENERAL

- A. Use materials of size and thickness shown or, if not shown, of required size and thickness to produce strength and durability in finished product. Smooth exposed edges.
- B. Weld corners and seams continuously, complying with AWS recommendations. At exposed connections, grind exposed welds smooth and flush to match and blend with adjoining surfaces.
- C. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible.

D. Provide for anchorage of type shown, coordinated with supporting structure. Fabricate and space anchoring devices to provide adequate support for intended use.

2.03 ITEMS

A. Anchor Bolts: Fabricate of ASTM F1554-07a unless noted otherwise, threaded one end with nut and washer, other end as detailed. Shop paint portion not embedded in mortar in concrete.

B. W-Shape Steel Lintels: Fabricate to sizes shown of ASTM A992 steel with a minimum yield stress of 50 ksi. Provide over recesses or openings, including openings for mechanical trades, where concrete lintels are not specified. Not less than 8 inch bearing at each end. Shop paint.

C. Ladders with Safety Post

1. Aluminum alloy 6061-T6 fabrication. Stringers shall be 2½ inch x 3/8 inch, with 15/16 inch square non-slip rungs spaced at 12 inches on center. Mill finish.
2. Provide safety post with stainless steel lock pin and clamps.
3. Install per manufacturer recommendations.

D. Pipe Bollards: Galvanized steel pipe, Grade 40, to required length. Shop paint.

E. Floor Access Hatches - Frames and Covers

1. The frames and covers shall conform to the sizes and be installed at the locations shown on the plans. Access frames and covers are to be as manufactured by ITT Flygt Corp, (Syracuse Castings Sales Corp.) or equal.
 - a. Waste Backwash Pumping Station -Valve Vault
 - (1) Size (Overall) 36" x 36"
 - (2) Clear Opening 36" x 36"
 - (3) Model Number H36363191
 - b. Waste Backwash Pumping Station -Wet Well
 - (1) Size (Overall) 48" x 72"
 - (2) Clear Opening 48" x 72"
 - (3) Model Number H42423191
2. Each access cover shall have a 1/4" thick aluminum diamond pattern cover designed to withstand pedestrian loading equivalent to 300 psf.
3. Channel frame shall be 1/4" aluminum with an anchor flange around the perimeter and have a minimum cross-sectional area of 7 1/2 square inches for proper water drainage. Door (s) shall be equipped with type 316 stainless steel hinges having a 3/8" minimum stainless steel pin and designed so that the door leaves do not open down into the channel

frame. Hinges shall be through-bolted to the covers with stainless steel tamperproof lock bolts and to the frame with stainless steel bolts and lock nuts. Each cover shall be equipped with compression springs enclosed in telescopic tubes. Upper tube shall be the outer tube to prevent accumulation of moisture, grit and debris inside the tube assembly. Each cover shall be fitted with the required number and size of compression spring operators to afford ease of operation through the entire arc of opening and act as a check in retarding the downward motion when being closed. Cover shall be counterbalanced and shall provide for smooth, easy and controlled door operation throughout the entire arc of opening and closing. Covers shall be easily opened or closed with one hand but this shall not be achieved through the use of over sprung or under sprung covers. Operation shall not be affected by temperature. Each cover shall be equipped with a hold-open arm which automatically locks the cover in the open position. A conveniently located handle shall release each cover for closing. A Type 316 stainless steel snap lock having a removable handle and a gasketed cover plug shall be provided. A recessed pad lock hasp and flap shall be provided in the cover. A 1 1/2" drainage coupling shall be located in the front right corner of the channel frame. All hardware, including lock, hold open arms, hinges, hinge pins, spring tubes, springs, safety chain and fasteners shall be type 316 stainless steel. All fasteners shall be Type 316 stainless steel. Installation shall be in accordance with manufacturer's instructions. Manufacturer shall guarantee (in writing) against defects in material or workmanship for a period of five years.

4. The mill finish aluminum shall receive a coal tar epoxy coating applied to the exterior of the frame where in contact with concrete.
5. The access cover shall be provided with a Flygt Safe-Hatch, or equal, integral safety grate that provides fall protection per OSHA standard 1910.23 and controlled confined space entry per OSHA standard 1910.146. The safety grate shall be made of 6061-T6 aluminum. The grating shall be designed to withstand a minimum live load of 300 pounds per square foot. Deflection shall not exceed 1/150th of the span. Grate openings shall be 5" x 5".

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Perform cutting, drilling and fitting required.
- B. Set work accurately in place, alignment and elevation, measured from established lines and levels. Provide anchorage devices and fasteners where necessary for items built into concrete or masonry.
- C. Set loose items on cleaned bearing surfaces, using wedges or other adjustments as required. Solidly pack open spaces with bedding mortar, using commercial non-shrink grout material specified in Section 03600 - GROUT.
- D. Pipe Bollards: Fill with concrete as specified in Section 03600 - GROUT. Round off top for drainage.
- E. Furnish sill angles or other items to concrete or masonry contractor for setting in place.
- F. Touch-up shop paint after installation. Clean field welds, bolted connections and abraded areas, and apply same type paint as used in shop.
- G. Paint surfaces of aluminum in contact with other materials with two coats of bituminous paint.

*** END OF SECTION ***

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DIVISION 07 – THERMAL AND MOISTURE PROTECTION

SECTION 07920

SEALANTS AND CAULKING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Caulking joints around openings in exterior walls, and sleeves wherever sleeves pass through concrete floor, and other materials, sidewalk joints, control joints and where otherwise indicated or required.

1.02 REFERENCES

A. FS TT-S-230: Sealing Compound, Elastomeric Type, Single Component.

1.03 SUBMITTALS

A. Catalog data and color charts for review. Sealant color will be selected for compatibility with adjoining materials.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver materials in original, tightly sealed containers or unopened packages with manufacturer's name, labels, product identification, and lot numbers where appropriate.

B. Store materials out of weather in original containers or unopened packages as recommended by manufacturer.

C. Do not use materials that have been stored for a period of time exceeding maximum recommended shelf life.

1.05 GUARANTEE

A. Contractor provide his written guarantee as follows: "Caulking is guaranteed against leaks, defects of workmanship and materials for a period of 5 years from the date of Substantial Completion, and caulking and damage to building caused by such leaks will be repaired without cost to the Owner."

PART 2 - GENERAL

2.01 MANUFACTURER

- A. Pecora Corporation, Harleysville, PA 19438.
- B. Approved substitution.

2.02 MATERIALS

- A. General Purpose Urethane Sealant: Dynatrol 1-XL. Moisture-curing single-component non-sag polyurethane sealant, Type II, Class A.
- B. Self-Leveling, Traffic Grade Polyurethane Sealant: TT-S-230C, Type I, Class A Urexpam NR-201, one part self-leveling moisture-curing urethane sealant.
- C. General Purpose Silicone Sealant: TT-S-230C Pecora 860 one-part acetoxysilicone, high-modulus acid cure, FDA approved.
- D. Backer Rod: Polyethylene foam, closed cell, compatible with sealant.
- E. Joint Cleaner: Methyl ethyl ketone, toluene, xylene.
- F. Joint Primer: Type as recommended by caulking manufacturer.
- G. Bond Breaker: Pressure sensitive adhesive polyethylene tape.
- H. Masking Tape: Pressure sensitive adhesive paper tape.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine joints for construction defects which would adversely affect execution of work.
- B. Ensure that masonry and concrete have cured 28 days minimum.
- C. Do not start work until conditions are satisfactory.

3.02 PREPARATION

- A. Cleaning: Clean joint surfaces, using joint cleaner as necessary. Joints must be free of dust, dirt, oil, grease, rust, laitance, release agents, moisture, or other matter which might adversely affect adhesion of sealant.
- B. Masking: Mask areas adjacent to joints.
- C. Primer: Apply if required, following manufacturers instructions.

3.03 APPLICATION

- A. Install bond breaker tape where recommended by sealant manufacturer.
- B. Install backing material in joints using blunt instrument to avoid puncturing. Do not twist rod while installing. Install backing so that joint depth is 50% of joint width, but a minimum of 3/8 inch deep.
- C. Apply sealant in joints using pressure gun with nozzle cut to fit joint width. Make sure sealant is deposited in uniform, continuous beads without gaps or air pockets.
- D. Tool joints to required configuration within 10 minutes of sealant application. If masking materials are used, remove immediately after tooling.
- E. Install self-leveling sealant in sidewalk joints as recommended by the manufacturer using bond breaker tape at base of joint to prevent bonding of joint filler to sealant.

3.04 CLEANING

- A. Remove excess materials adjacent to joints by mechanical means or with MEK, toluene or xylene as work progresses to eliminate evidence of spillage or damage to adjacent surfaces. Note: When using flammable solvents, avoid heat, sparks and open flames. Always provide adequate ventilation and follow precautions listed on solvent container label.
- B. Leave finished work in neat, clean condition with no evidence of spillovers onto adjacent surfaces.

*** END OF SECTION ***

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DIVISION 09 – FINISHES

SECTION 09900

PAINTING – PROCESS EQUIPMENT AND TANKS

PART 1 – GENERAL

1.01 DESCRIPTION

A. Includes all work to be painted including, but not limited to, interior of tanks, equipment, pumps, piping, valves, conduits, and other related items.

B. Related Work Specified Elsewhere:

1. Section 01300: Submittals
2. Section 07920: Sealants and Caulking
3. Division 11: Equipment
4. Division 16: Electrical
5. Pre-finishing or shop priming requirements as specified in various other Sections of these Specifications.

1.02 QUALITY ASSURANCE

A. Applicator Qualifications: Painting applicator shall show evidence of acceptability as a qualified applicator by the manufacturer of products specified herein. Submit such evidence with Submittals as specified herein.

B. Referenced Standards:

1. Steel Structures Painting Council Surface Preparation Specifications:
 - a. SSPC-SP1, Solvent Cleaning.
 - b. SSPC-SP2, Hand Tool Cleaning.
 - c. SSPC-SP6, Commercial Blast Cleaning.
 - d. SSPC-SP7, Brush Blast Cleaning.
 - e. SSPC-SP8, Pickling.
 - f. SSPC-SP10, Near-White Blast Cleaning.

1.03 SUBMITTALS:

A. Samples: Submit sample color chips of standard colors and samples of any intermixes required to match colors indicated.

B. Schedule and Product Data: Submit paint schedule in same format as the paint schedule herein, and indicate which of the selected manufacturer's products are intended for use. Do not perform painting or coating work without Engineer's approval of submitted paint schedule.

C. Certificates: Paint manufacturer's direct factory representative shall certify in writing to the Engineer painting and coating compliance with the following:

1. Factory representative's initial site inspection of conditions pertinent to painting and coating work with Contractor or his authorized painting representative.
2. Factory representative's second site inspection at completion of painting and coating work to check proper application and actual mil thickness compliance with these Specifications.
3. Certification issued to Engineer only following unacceptable painting and coating work being rectified to Engineer's satisfaction.
4. Factory representative shall make his services available to the Engineer for immediate consultation in regard to the painting and coating work, and shall make above stated inspections in the Engineer's presence.

D. Operation and Maintenance Data: Upon approval of painting schedule, submit six copies of a detailed maintenance manual including the following information:

1. Name, address and telephone number of manufacturer and local distributor.
2. Product name, number, and technical data sheet for each type of paint.
3. Detailed procedures for routine maintenance and cleaning.
4. Detailed procedure for light repairs such as dents, scratches and staining.

E. Maintenance Materials: Turn over to the Owner upon completion of the project a full set of pipeline identification stencils. Deliver to Owner extra materials from same production run as products installed. Package products with protective covering and identify with descriptive labels. Provide 1 gal (3.8 L) of each color and texture to owner at completion.

1.04 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver paint materials to job site in their original unopened containers with labels intact and legible at time of use.

B. Store approved materials at the job site in a suitable and designated area restricted to storage of paint and coating materials and related equipment.

C. Use all means necessary to ensure safe storage and use of paint and coating materials and the prompt and safe disposal of waste. Store paint and coating products protected from weather when such products may be affected by freezing.

1.05 JOB CONDITIONS

A. Field and Shop Coat Compatibility: To insure satisfactory paint and coating performance, it is a Contract requirement that products applied in the shop and field be mutually compatible.

1. Contractor shall require fabricators and equipment manufacturers to apply shop coats that are compatible with field coats specified herein.
2. Above requirement does not apply to full factory–finished items, that is, items having both primer and final finish coatings, except as specified in the following paragraphs.

B. Painting Factory–Finished Equipment: Equipment, such as motors, pumps and other such items, which when installed become an integral part of a system and which may be delivered fully factory–finished (that is, having finish coatings in addition to the prime coating) shall not require repainting in the field unless specifically noted otherwise, or:

1. Factory finish is unacceptable to the Engineer, that is, not having generic type of paint or proper mil thickness to withstand corrosive atmosphere of wastewater treatment plants or is not compatible with color schedule.
2. Factory finish is damaged.
3. On factory–finished items requiring repainting, first sand existing paint to a dull finish and then repaint in scheduled finish system for the installed location of such factory–finished items.

C. Painting Caulking Compound: Do not apply paint over caulking compound until integral solvents have been released from the compound; usually two weeks for butyl–rubber based caulking and one day for acrylic latex caulking.

D. Color:

1. As selected by the Engineer or noted herein.
2. Paint equipment not furnished with a factory finish, or not finished with an acceptable factory finish, and piping and conduits the same color as adjacent surface.
3. Final work shall match Engineer approved samples. Engineer shall select colors where not indicated or specified with no extra compensation allowed the Contractor for such.

E. Placing into Service: Do not place painted items into service until paints and coatings are fully cured (dry–hard).

F. Environmental Requirements:

1. Adhere to manufacturer's data on air and surface temperature limits and relative humidity during application and curing of coatings.
2. Do not spray apply paint when wind velocity is above 15 mph.
3. Schedule coating work to avoid dust and airborne contaminants.
4. Apply exterior finishes during daylight hours only.
5. When painting must be done in confined spaces, or because of unfavorable ambient conditions, longer drying times will be necessary.
6. Provide supplementary ventilation such as fans and blowers in confined or enclosed areas to carry off solvents during the evaporation stage.
7. Contractor shall comply with all applicable Maryland Air Quality Regulations to ensure that construction activities do not exceed air quality emission thresholds.

G. Protection:

1. Protect paint materials before, during and after application, and protect other work and materials with drop cloths or other impervious material.
2. Clean up or otherwise remedy without additional cost, damage by paint and coatings to public or private property.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Paint materials listed in the Paint Schedule are products of Tnemec Company, Inc. Equivalent products of other manufacturers may be used, subject to approval.

B. Request for substitution shall include manufacturer's literature for each product giving the name, generic type, descriptive information, solids by volume, recommended dry film thicknesses and a list of five projects where each product has been used and rendered satisfactory service. No request for substitution shall be considered that would decrease film thickness or offer a change in the generic type of coating specified. Manufacturer's certified test reports showing that the substitute product(s) equal or exceed the performance of the specified products as outlined shall be submitted.

C. Acceptable manufacturers for painting of architectural components of the building are listed in Section 09910:

D. Acceptable manufacturers for concrete tank surfaces coating system:

1. Tnemec Company, Inc.
2. Or Equal.

2.02 MATERIALS

A. Paints and Coatings – General

1. Acceptable products: Indicated in Schedules at the end of this section.
2. Unless otherwise indicated, provide factory-mixed coatings. When required, mix coatings to correct consistency in accordance with manufacturer's instructions before application. Do not dilute or thin coatings, except as instructed.
3. Do not add additives except as instructed or recommended by coating manufacturer.
4. Supply each coating material in quantity required for this section from a single production run.
5. Colors: To be selected from manufacturer's full range of available coatings.

B. Coating Application Accessories: Specified in this section or in coating manufacturer's application instructions, including but not limited to thinners, sealers, primers, cleaning agents, etching agents, cleaning cloths, sanding materials, and clean-up materials.

PART 3 – EXECUTION

3.01 SURFACE PREPARATION

A. Ferrous Metal:

1. Shop Primed:
 - a. Immediately before paint application, clean sand, dust, mud, dirt, and other foreign matter from shop coat.
 - b. Touch up damaged or destroyed shop paint.
 - c. Surface preparation of surfaces to be touched up must be as effective as those specified for shop painting.
2. Not Shop Primed and Submerged or Intermittently Submerged in Liquid:
 - a. Grind smooth to a rounded contour sharp edges and welds, and remove weld splatter.
 - b. Except for insides of pipes, sandblast in accordance with SSPC SP-10 or pickle in accordance with SSPC SP-8.
 - c. After sandblasting, remove dust and spent sand from surface by brushing or vacuum cleaning.
 - d. Apply prime coat before surface starts to rust.
 - e. Do not allow sandblasted surface to stand overnight before coating.
3. Not Shop Primed and Non-Submerged:
 - a. Grind smooth to a rounded contour sharp edges and welds, and remove weld splatter.

- b. Sandblast in accordance with SSPC SP-6.
- c. After sandblasting, remove dust and spent sand from surface by brushing or vacuum cleaning.
- d. Apply prime coat before surface starts to rust.
- e. Do not allow sandblasted surface to stand overnight before coating.

B. Galvanized Metal Including Pipes and Conduits:

1. Solvent clean in accordance with SSPC SP-1.
2. Sand clean and spot prime abraded areas
3. Etch metal using Clean N'Etch by Great Lakes Laboratories, Inc. or equal product. Follow manufacturer's written procedures.
4. Allow to dry before application of paint.

C. Shop Bituminous Coated Pipe: Hand tool clean in accordance with SSPC SP-2.

D. Polyvinyl Chloride Pipe:

1. Solvent clean using bio-degradable cleaner such as Extra Muscle by Great Lakes Laboratories or equal and thoroughly rinse clean.
2. Sand manually or mechanically with 60-80 grit aluminum oxide sandpaper and wipe off dust residue.

E. Pipe Insulation: Clean free of dirt, dust, or other foreign matter.

3.02 APPLICATION

A. General:

1. Strictly follow paint manufacturer's label instructions for mixing, thinning, proper spreading rate and drying time. In no case shall film thickness be less than manufacturer's recommendations nor shall area coverage per gallon exceed manufacturer's recommendations.
2. If material has thickened or must be diluted for application, the coating shall be built up to the same film thickness achieved with undiluted material. Do not use thinner to extend coverage of the paint.
3. Regardless of the surface, it shall be the painter's responsibility to achieve a protective and decorative finish either by decreasing the coverage rate or by applying additional coats of paint.

B. Method of Application:

1. Workmanship: In general, finished surface regardless of method of paint application shall show no evidence of improper application according to

accepted trade practice. Do not use paint rollers having nap exceeding 3/8 inch.

2. Multi-coat Application:

- a. Succeeding coats of paint shall show visual difference from preceding coats. Each coat shall have a uniform appearance and be tinted to the final coat. The final coat shall present solid hiding with edges of paint adjoining other paint or materials made clean with and sharp without overlap. Wipe or otherwise render undercoats dust free just prior to application of succeeding coatings.
- b. Do not apply additional coats of paint until the film to be recoated is sufficiently cured to receive the next coat.
- c. If the time limit is exceeded for coatings that have a maximum recoat time, consult paint manufacturer before proceeding with next coat.

C. Painting Exposed/Concealed Surfaces:

1. It is a requirement of this specification that all interior surfaces be painted except as specified herein and elsewhere in the Specifications.
2. Paint exterior surfaces only as scheduled.
3. In interior exposed areas of structures, paint mechanical and electrical systems, including pipe, duct and conduit systems, except for full factory finished items as defined previously.
4. In interior concealed areas no painting is required including mechanical and electrical systems therein, except that pipe identification is required on piping in concealed but accessible areas.
5. Paint above stated exposed mechanical and electrical systems the same color as adjacent wall and/or ceiling color. Paint materials as scheduled herein.
6. Do not paint exposed aluminum or stainless steel surfaces.

D. Pipeline Identification:

1. Pipe Color: Paint exposed piping and valves in accordance with the following schedule:

<u>Service</u>	<u>Pipe Color</u>	<u>Band Color</u>	<u>Lettering Color</u>
Wastewater	Light Gray		Black
Waste Backwash	Light Green		White

2. After finish painting, mark exposed, non-submerged piping with stenciled name of contents and flow direction arrow at valves and fittings, on piping at both sides of walls and floors where pipes pass through, and on long

runs approximately every 30 feet or closer when directed. Specifically mark lines according to their size (diameter) and specific contents as directed by the Engineer or noted in the legend herein. Place legends and flow arrows where they can be easily read from the floor. Where pipes are adjacent to each other, arrange legends neatly in line. Use gothic style lettering with letter size as follows:

<u>Pipe or Covering Outside Diameter</u>	<u>Letter Size</u>
Under 3/4 inch	Do not paint
3/4 inch to 1-1/4 inch	1/2 inch
1-1/2 inch to 2 inch	3/4 inch
2-1/2 inch to 6 inch	1-1/4 inch
8 inch to 10 inch	2-1/2 inch

3. Identify pipes less than 3/4 inches outside diameter with brass or phenolic tags.
4. Paint valves and operators same color as connected piping.

3.03 CLEANING

A. Upon completion of work, remove paint and coating spots, oil and grease stains from floors, walls, fixtures, hardware and equipment, leaving their finishes in a satisfactory condition. Remove materials and debris from the site of work, and leave in a clean condition so far as this work is concerned.

B. Keep site free from accumulation of paint containers, solvents, thinner, and used cleaning cloths, and legally dispose of same off premises daily.

3.04 PAINT SCHEDULE – TANK SURFACES, EQUIPMENT AND PIPING

A. General: The paint systems are specified by their application type. The acceptable Tnemec coating systems are included to serve as a standard of quality for comparison. If an alternative paint system is offered, it must meet the same level quality including such items as mil thickness, solids content, VOCs, etc. The following paint systems are intended to include all items to be painted at the job site. Any item not specifically named herein but obviously required to be painted shall be painted in accordance with the system selected by the Engineer or otherwise painted as directed by the Engineer.

B. Schedule:

1. Concrete - Submerged and Non-Submerged:
 - a. Precast Concrete (interior of wet well and valve vault)
 - (1) Surface Preparation: See Section 3.01.F
 - (2) Fill Coat: Tnemec Series 280 Tneme-Glaze- Trowel apply to

- entire interiors of tanks, filling all holes and voids up to ½” depth and 2” diameter and to provide pinhole and void free surface (add 128 oz/gallon of Series 280 part C fumed silica to Series 280 or until a drywall mud consistency is achieved) at 60–80 sq. ft./ gallon, or less to provide pinhole and void free surface. Finishing:
- (3) Apply two coats of Coal Tar Epoxy Coating at 16-20 mils total dry thickness.
- b. Existing Concrete Structures – Existing Wet Well.
- (1) Surface Preparation: See Section 3.01.F.
 - (2) Fill coat: Tnemec Series 280 Tneme-glaze – Trowel apply to entire interiors of tanks, filling all holes and voids up to ½” depth and 2” diameter and to provide pinhole and void free surface (add 128 oz/gallon of Series 280 part C fumed silica to Series 280 or until a drywall mud consistency is achieved) at 60-80 sq. ft./gallon, or less to provide pinhole and void free surface. Finishing:
 - (3) Apply two coats of Coal Tax Epoxy Coating at 16-20 mils total dry thickness.
2. Ferrous Metal Surfaces – Non–Submerged:
- a. Interior exposed, iron or steel (includes pumps, piping and valves).
 - (1) Priming – Shop: One coat of Tnemec Series N69 Hi-Build Epoxoline II at 3.0 – 5.0 mils dry film thickness.
 - (2) Priming – Field: Touch–up with Series N69 Hi-Build Epoxoline II or if not shop primed, sandblast and prime with N69 at 3.0 – 5.0 mils dry thickness.
 - (3) Finishing: One coat of Tnemec Series N69 Hi-Build Epoxoline II at 4.0 – 6.0 mils dry film thickness.
 - (4) Total Dry Mil Thickness: 7.0 – 11.0 mils dry film thickness.
 - b. Exterior exposed iron or steel (includes pumps, piping and valves)
 - (1) Priming – Shop: Tnemec Series N69 Hi-Build Epoxoline II at 3.0 – 5.0 mils dry film thickness.
 - (2) Priming – Field: Touch–up with Tnemec Series N69 Hi-Build Epoxoline II or if not shop primed, sandblast and prime with above.
 - (3) Intermediate: Tnemec Series N69 Hi-Build Epoxoline II at 4.0 – 6.0 mils dry film thickness.
 - (4) Finish: Tnemec Series 74/75 Endura-Shield at 2.0 – 3.0 mils dry thickness.
 - (5) Total Dry Mil Thickness: 9.0 – 14.0 mils dry film thickness.
3. Ferrous Metal Surfaces – Submerged:
- a. Interior and exterior submerged or intermittently submerged iron or steel moving parts where drying coatings cannot obtain effective film thickness because of sharp edges (i.e., chains, sprockets,

- gears, etc.).
- (1) Priming – Shop: One coat of Tnemec Series N69 Hi-Build Epoxoline II at 4.0 – 6.0 mils dry thickness.
 - (2) Priming – Field: Touch up with above or, if not shop primed, sandblast and prime with N69 Hi-Build Epoxoline II at 4.0 – 6.0 mils dry thickness.
 - (3) Finishing: Two coats of Series N69 Hi-Build Epoxoline II at 7.0 – 9.0 mils dry thickness.
 - (4) Dry Mil Thickness: Priming – 14.0 – 18.0 excluding shop prime.
- b. Interior and exterior submerged or intermittently submerged iron or steel (includes pumps, piping and valves).
- (1) Shop Prime: One coat Tnemec Series N69 Hi-Build Epoxoline II at 3.0 – 5.0 mils dry thickness.
 - (2) Field Prime: Touch up with Tnemec Series N69 Hi-Build Epoxoline II at 3.0 – 5.0 mils dry thickness. If not shop primed, sandblast near white and apply N69 at 7.0 – 9.0 mils dry thickness.
 - (3) Finishing: Two coats of Tnemec Series N69 Hi-Build Epoxoline II at 7.0 – 9.0 mils dry film thickness per coat over sandblasted surface. (To achieve recommended dry film thickness, spraying is required.)
 - (4) Total Dry Mil Thickness excluding shop prime: 14.0 – 18.0 mils dry film thickness
4. Galvanized and Non-Ferrous Metal Surfaces:
- a. Interior Exposed (Includes piping and miscellaneous fabrications).
- (1) Priming – Tnemec Series N69 Hi-Build Epoxoline II at 2.0 - 3.0 mils dry film thickness.
 - (2) Finish – Tnemec Series N69 Hi-Build Epoxoline II at 2.0 - 3.0 mils dry film thickness.
 - (3) Total Dry Mil Thickness: 4.0 – 6.0 mils dry film thickness.
- b. Exterior Exposed (Includes piping and miscellaneous fabrications).
- (1) Priming – Tnemec Series N69 Hi-Build Epoxoline II at 2.0 - 3.0 mils dry film thickness.
 - (2) Finish – Tnemec Series 74/75 Endura-Shield at 2.0 - 3.0 mils dry film thickness.
 - (3) Total Dry Mil Thickness: 4.0 – 6.0 mils dry film thickness.
- c. Submerged or intermittently submerged (Includes piping and miscellaneous fabrications).
- (1) Priming – Tnemec Series N69 Hi-Build Epoxoline II at 3.0 - 5.0 mils dry film thickness.
 - (2) Finish – Tnemec Series N69 Hi-Build Epoxoline II at 4.0 - 6.0 mils dry film thickness.
 - (3) Total Dry Mil Thickness: 7.0 – 11.0 mils dry film thickness.
5. Polyvinyl Chloride Piping and All Piping Insulation:
- a. Interior Exposed

- (1) Priming – Tnemec Series N69 Hi-Build Epoxoline II at 2.0 - 3.0 mils dry film thickness.
 - (2) Finish – Tnemec Series N69 Hi-Build Epoxoline II at 2.0 - 3.0 mils dry film thickness.
 - (3) Total Dry Mil Thickness: 4.0 – 6.0 mils dry film thickness.
- b. Exterior Exposed
- (1) Priming – Tnemec Series N69 Hi-Build Epoxoline II at 2.0 - 3.0 mils dry film thickness.
 - (2) Finish – Tnemec Series 74/75 Endura-Shield at 2.0 - 3.0 mils dry film thickness.
 - (3) Total Dry Mil Thickness: 4.0 – 6.0 mils dry film thickness.

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DIVISION 11 - EQUIPMENT

SECTION 11040

EQUIPMENT GENERAL PROVISIONS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Related Work Specified Elsewhere.
 - 1. Section 09900: Painting.
 - 2. Division 11: Equipment.
 - 3. Division 13: Special Construction
 - 4. Division 14: Conveyance Systems
 - 5. Division 16: Electrical.

1.02 PERFORMANCE AFFIDAVITS

- A. Provide performance affidavits for products listed in the Schedule of Equipment Testing and Manufacturer's Services, included at the end of this Section, and as required in the individual technical sections.
- B. Submit performance affidavits in conformance with Section 01300.
- C. By these affidavits, each manufacturer must certify to the Contractor and the Owner, jointly, that he has examined the Contract Documents and that the equipment, apparatus, process or system he offers to furnish will meet in every way the performance requirements set forth in the Contract Documents. Equipment design, manufacturing and assembly specifications are an integral part of the performance requirements.
- D. Shop drawings will not be reviewed prior to receipt by the Engineer of an acceptable performance affidavit.
- E. The performance affidavit must be signed by an officer (vice president or higher) of the basic corporation, partnership or company manufacturing the equipment, and witnessed by a notary public.
- F. The performance affidavits shall be in the following format:

Addressed to: _____ Contractor _____ and _____ Owner) _____
Reference: Contract No. _____
(Project) _____
Text: “(manufacturer’s name) _____ has examined the Contract documents and verified that the _____ product) _____ meets in every way the performance requirements and design specifications set forth in Section (s) _____ of the Contract Documents.”
Signature: Corporate officers shall be vice president or higher (unless statement authorizing signature is attached).
Notary: Signature(s) must be notarized.

1.03 QUALITY ASSURANCE

A. 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.

1. Both the Underwriters' Laboratories (UL) Listings and Approvals and the National Electrical Manufacturers' Associations (NEMA) stamps or seals shall be evidenced where applicable to electrical apparatus forming parts of the "mechanical" equipment.

B. Certificates and Permits: Upon completion of work, and prior to final payment, furnish to the Engineer formal certification of final inspections from authorities having jurisdiction and secure required permits, if any, from same. Additionally, prepare detailed diagrams and drawings which may be required by those authorities having jurisdiction.

C. Reference Standards: Steel Structures Painting Council.

1. Surface Preparation Specifications.
 - a. SSPC-SP 6, Commercial Blast Cleaning.
 - b. SSPC-SP 8, Pickling.
 - c. SSPC-SP 10, Near-White Blast Cleaning.
2. Paint Application Specifications: SSPC-PA 1, Shop, Field and Maintenance Painting.

1.04 SUBMITTALS

A. Shop Drawings: Shop Drawings, Operation and Maintenance Manual, and as-built drawings shall be submitted as specified in Section 01300 - SUBMITTALS and as further stipulated hereinafter.

B. Submit shop drawings for the following items within thirty (30) days after Notice to Proceed:

1. Membranes
2. All Pumps
3. Air diffusers
4. Submersible Mixers
5. Blower for DIP Tank
6. Hoists and Crane
7. Waste Backwash Settling Tank

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

A. General: In addition to requirements for materials handling and storage as stated in the General Conditions of the Contract, the following applies:

1. When unloading materials, equipment and machinery provide special lifting harness or apparatus as may be required by manufacturers. Handle materials, equipment and machinery in accordance with manufacturer's written instructions.
2. Store materials, equipment and machinery, both on and off site, in accordance with manufacturer's written instructions. Additionally, provide manufacturer's certificates of proper materials, equipment or machinery storage. Prior to issuance of such certificates, a manufacturer's representative shall visit the site of storage and examine materials, equipment or machinery in actual storage conditions.

1.06 JOB CONDITIONS

A. Electrical Interface.

1. Install or mount, as work of Division 11 - EQUIPMENT, such electrical components or apparatus as provided by product manufacturer's specified under the various sections of Division 11.
2. Power wiring, including final connections of such to electrical components or apparatus of Products specified shall NOT be performed as work of Division 11 - EQUIPMENT but as work of Division 16 - ELECTRICAL.
3. Motor starters required under this Division of the Specifications will be provided under Division 16 of the Specifications except the motor starters specified with equipment in this Division of the Specifications.

B. Field and Shop Coat Compatibility: To insure satisfactory paint and coating performance, it is a Contract requirement that products applied in the shop and field be mutually compatible.

1. Contractor shall require fabricators and equipment manufacturers to apply
-

shop coats that are compatible with field coats specified in Section 09900
- PAINTING.

1.07 GENERAL DESIGN OF EQUIPMENT AND MACHINERY

A. All equipment and machinery furnished under this contract shall be of the latest and most improved design suitable for the service of which it is to be used. All equipment and machinery shall be designed and constructed to operate efficiently, continuously and quietly under the specified requirements with a minimum of labor, power, maintenance, renewals and repairs. The design and construction of all equipment and machinery shall be such as to permit operation with minimum noise, wear and vibration (maximum amplitude of 3.0 mils unless otherwise specified) when properly installed.

B. Ample room for erecting, repairs, inspecting and adjusting all equipment and machinery shall be provided. The design, construction and installation of all equipment and machinery shall conform to and comply with the latest safety codes and regulations.

C. The design and construction of the several units shall be such that they shall present a uniform appearance and the arrangement shall be such that their operation shall be in harmony in every respect. Whenever possible, fittings and fixtures of the same make and model shall be used for the several units and their connections. All equipment of identical type and service shall be the product of the same manufacturer.

D. All equipment selected shall be of such size and general arrangement to suit the space in which it is to be installed.

E. The various parts of the equipment and machinery shall be of plain shape and good lines, especially designed and constructed for strength and durability. Casting shall be designed and constructed to cool uniformly without shrinking strains and shall have good sized fillets at all re-entrant corners. Sudden change of section shall be avoided.

F. Whenever possible, parts of each unit shall be made to gauge and be a duplicate of and interchangeable with the same parts of other machines of the same size and kind.

G. The workmanship shall be of the highest class throughout.

H. All assemblies shall be completely shop fabricated and structural steel parts shall be shop erected. Assemblies and structural steel parts shall be matchmarked before being disassembled for shipment. Parts shall be shipped assembled in as large unit as possible to minimize field reassembly. All parts shall be amply proportioned for all stresses which may occur during operation, and for any additional stresses which may occur during fabrication and erection.

I. Unless otherwise specified, welding shall be in accordance with the latest standard specifications for "Gas Tight Welding" of the American Welding Society.

J. Unless otherwise specified, galvanizing shall be hot-dipped, in accordance with the latest standard specifications for "Zinc Coating" of the ASTM, Serial Designation A-123.

PART 2 - PRODUCTS

2.01 MATERIAL IN CONTACT WITH POTABLE WATER

A. All materials, mechanical devices and coatings in contact with potable water shall comply with National Sanitation Foundation/American National Standards Institute Standards (NSF/ANSI) 60 and 61 and shall be inert, nontoxic, and shall not impart any taste, odor or color to the water.

2.02 MATERIALS

A. Unless otherwise specified, materials shall be in accordance with the following latest Standard Specifications of the ASTM:

1.	Structural Steel:	A-36
2.	Welding Steel Pipe:	A-53
3.	Iron Castings:	A-48
4.	Babbitt:	B-23
5.	Bronze Castings:	B-30
6.	Bronze (Manganese):	B-138
7.	Bronze (Silicone):	B-98
8.	Steel Bolts:	A-307
9.	Hot Dip Zinc Coating:	A-123

B. All materials shall, if required, be tested and shall fulfill all requirements. Physical tests may be made by the Owner. The Contractor at his own expense shall furnish test pieces and samples in the number, shape, size and finish required by the Engineer. All broken material shall become the property of the Owner. The failure of test specimens to fully conform to the requirements of the specifications shall be sufficient cause for rejection of the whole melt or stock from which samples were obtained.

C. Iron castings shall be smooth, clean and free from scale, lumps, blisters and other defects. No plugging, welding or filling will be allowed.

D. The alloy grade number of all babbitt shall be that bearing alloy of a composition recommended by the manufacturer of the equipment or machinery for the service required, subject to the approval of the Engineer.

E. All bronze shall be made of new material and shall be free from objectionable imperfections. If the materials show signs of improper mixing when being machined, the castings will be rejected.

2.03 JOURNALS, BEARINGS AND KEYS

A. Journals and bearing surfaces shall be of sufficient size and properly proportioned for the least wear and to avoid heating under all conditions, and where necessary, provisions shall be made for easy removal and for proper adjustments. Journals shall be suitable boxes which, where necessary, shall be lined with babbitt metal hammered into grooves and bored in place. If bearings are of the ball bearing type, both inner and outer races as well as the balls shall be heat treated steel to resist wear. The balls shall be of ample size to carry the maximum loads with a large factor of safety to prevent flaking, spalling, or crushing. The balls shall be properly spaced and held in position by rugged continuous spacing or retainer rings.

2.04 LUBRICATION

A. The Contractor shall furnish lubrication charts or schedules for each piece of equipment or machinery. The charts or schedules shall designate each point of lubrication, the type of lubricant to be applied and the frequency of lubrication. Charts and schedules shall be submitted to the Engineer in quadruplicate, bound in folios, with each chart or schedule protected by a transparent plastic envelope.

B. The Contractor shall furnish one (1) year's supply of each type of lubricant. A typewritten list shall be furnished with the lubricants, designating the specific lubricant to be used for each piece of equipment. This is in addition to the required operating and maintenance manuals which will also contain lubrication requirements.

2.05 MOTORS AND CONTROLS - GENERAL

A. Motors and controls shall conform to the latest requirements of IEEE and NEMA, and where applicable, shall be UL listed. Minimum sizes are specified with the driven equipment. Motor starting and control equipment is specified either with the motor which is controlled or in an electrical specification section. The Contractor is advised to consult all specification sections to determine responsibility for motors and controls.

B. Motors shall be designed, built, and tested in accordance with the latest revision of NEMA Standard MG 1.

C. Motors shall be suitable for use under the conditions and with the equipment which applied and designed for operation on the electrical systems specified or indicated.

1. Motor capacities shall be such that the horsepower rating and the rated full-load current will not be exceeded while operating under the specified

operating conditions. Under no condition shall the motor current exceed that indicated on the nameplate.

2. Motor sizes noted in the individual equipment specifications are minimum requirements only. It is the responsibility of the equipment manufacturers and of the Contractor to furnish motors, electrical circuits and equipment of ample capacity to operate the equipment without overload, without exceeding the rated full-load current, or overheating at full-load capacity under the most severe operating service of this equipment. Motors shall have sufficient torque to accelerate the total WR^2 of the driven equipment to operating speed.
3. Motors shall be continuous duty type and shall operate quietly at all speeds and loads.
4. Motors shall be designed for operation on 60 hertz power service. Unless otherwise specified or shown, motors less than 1/2 horsepower shall be single phase, and motors 1/2 horsepower and larger shall be 3 phases.
5. Motors shall be mounted so that the motor can be removed without removing the entire driven unit.

D. Single phase motors smaller than 1/20 horsepower shall be ball or sleeve bearing, drip-proof, totally enclosed or explosion proof, as specified, 115 volts, permanent split capacitor, or shaded pole type. These motors shall not be used for general power purposes and shall only be provided as built-in components of such mechanical equipment as fans, unit heaters, humidifiers, and damper controllers.

E. Single phase motors 1/20 horsepower and larger shall be ball bearing, drip-proof, totally enclosed or explosion proof, as specified, with Class A or B insulation, as standard with the motor manufacturer; 115, 115/230, 200 or 230 volts as required; capacitor start-induction run, permanent split capacitor, or repulsion start-induction run type.

F. Except as otherwise specified in the various specification sections, 3 phase motors shall meet the requirements of this paragraph. Motors shall be NEMA design B squirrel cage induction type. Insulation shall be Class F and motor shall be rated at no greater than 50°C rise for open motors and 65°C rise for closed motors both above an ambient temperature of 45°C. At 40°C ambient temperature explosion proof and totally enclosed motors shall have a 1.00 service factor and drip-proof motors shall have a service factor of 1.15 or higher. Motors specified for operation at 480 volts shall be nameplated 460 volts.

G. Three phase motors shall be E-plus Energy Efficient Standard Duty Motor of the Electric Motor Division of Goulds, Inc., the MAC II High Efficiency motor of Westinghouse Electric Corporation, the equivalent product of Baldor Company, or equal.

2.06 FLANGES AND BOLTS

A. Flanges, except as otherwise specified, shall be cast solid, and bolt holes shall be drilled and spot-faced on the back. Stud holes shall not be drilled through. Flanges shall be uniform in thickness and shall come fair and, if required, shall be turned or chipped in a neat and workmanlike manner.

B. Jacking screws shall be provided for covers, etc. were required, and also suitable eye bolts for lifting. Bolts and nuts shall be of the best quality of open hearth, free machining steel. Bolts shall have good, sound well-fitting threads; nuts shall be cold pressed. All heads, nuts and threads shall be of the American Standard regular sizes. All ferrous bolts and nuts shall be galvanized by the hot dipped process.

2.07 COUPLINGS

A. Except where otherwise specified for a particular item of equipment, all equipment where flexible couplings are specified or are required for the purpose, a standard self-aligning forged steel coupling with sealed lubrication, as manufactured by Thomas, Koppers, Falk, Sier-Bath, or equal shall be provided between each motor and its driven equipment. One hub of the coupling shall be firmly fixed and keyed to the equipment shaft with the other hub similarly secured to the abutting drive shaft. Couplings shall be placed as close as possible to the driven equipment and the motor bearings to make compactly arranged units. Couplings shall be of all metal construction and shall be moistureproof and dustproof. Arrangements of couplings shall be such that there is sufficient room to place a dial indicator for alignment checking of shafts of the motor driven equipment. Each coupling shall be provided with an easily removable guard meeting all OSHA requirements.

B. All equipment and motors/drives shall be field aligned using a dial indicator in accordance with the procedures established by the latest revision of the Hydraulic Institute Standards. Parallel and angular misalignment shall not exceed the limits recommended by both the equipment and the coupling manufacturer.

2.08 EQUIPMENT BEDPLATES

A. The various items of motor driven equipment, such as pumps, shall be mounted on structural steel bedplates. The bedplates shall be adequate size to accommodate the equipment and its motor, to form an integral rigid mounting platform. Steel or brass shims shall be used to level equipment bedplates mounted in contact with concrete pads or floors. Jacking bolts or jacking (leveling) nuts on mounting studs shall not be used in lieu of shims. Bedplates shall be grouted to the concrete base and shall be filled with grout in all instances where the manufacturer has made provision for introducing grouting mixture into bedplate cavities. It shall be the Contractor's complete responsibility to determine the proper method, to provide all materials and components required, and to coordinate the work, to set, couple, align and install all equipment in a satisfactory manner.

B. All centrifugal fans shall be mounted on steel springs or rubber-in-shear vibration isolation units. These may be either shop provided with the equipment or separately field mounted.

2.09 ANCHORS

A. Stainless Steel Anchor Bolts: ASTM A 320 Grade B8, AISC Type 304.

B. Expansion Anchors: Conforming to Federal Specification FF-S-325, Group II, Type 4, Class 1 Stainless Steel Type 304; such as Hilti Kwik-Bolt, Phillips Red Head Wedge-Anchor and Molly Parabolt, or equal.

2.10 SHOP PAINTING

A. Prior to painting remove all rust, dust and scale as well as other foreign substances on ferrous metal surfaces to be prime painted in the shop, by sand-blasting or pickling.

1. Sand-blasting shall conform to requirements of the latest edition of SSPC-SP6, Commercial Blast Cleaning.
2. Pickling shall conform to requirements of the latest edition of SSPC-SP8, Pickling, or SSPC-SP10.

B. The ferrous metal surfaces thus cleaned shall be prime painted as soon as possible after cleaning to prevent new rusting.

C. All ferrous metal surfaces of equipment, apparatus, and devices shall receive a shop coat of primer (except acceptable factory finished surfaces) unless otherwise specified.

D. Apply shop paint in accordance with SSPC-PA-1. Minimum dry mil thickness at 1.5 to 2 mils.

2.11 SPECIAL TOOLS

A. Special tools shall include any type of tool that has been specially made for use on an item of equipment for assembly, disassembly, repair or maintenance. Any special tools that are required to assemble, disassemble, repair or maintain any mechanical equipment shall be furnished with the equipment.

2.12 NAMEPLATES FOR EQUIPMENT AND INSTRUMENTATION

A. Nameplates shall be included for all equipment provided under this Contract. Nameplates shall be attached to the machinery casing and to the panel where required for panel boards. Nameplates shall be white-laminated phenolic plastic having

engraved black letters and beveled white trim, except where specified otherwise. Nameplates shall be engraved with minimum 1/4-inch letters showing the equipment name and number as given on the Contract Drawings or as specified during the shop drawing submittal. All equipment and instrumentation nameplates shall be screwed into the equipment frames or where directed by the Engineer. Nameplates shall be furnished by the Contractor.

PART 3 - EXECUTION

3.01 INSTALLATION

A. The general arrangement of pipe and equipment shall be as shown on the Drawings. Detailed drawings of proposed departures due to actual field conditions or other causes shall be submitted to the Engineer for approval. The Contractor shall carefully examine the drawings and shall be responsible for the proper fitting of materials and equipment as indicated, without substantial alteration. Because of the small scale of the drawings, it is not possible to indicate the exact location of piping, all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the space requirements for proper clearances and the structural and finish conditions affecting his work and shall arrange such work accordingly, furnishing such offsets, fittings, valves and accessories as may be required to meet such conditions.

B. Each trade shall determine the location, size, etc. of all chases and openings required for the proper installation of its work and shall see that such are provided. Where it is necessary to run pipes or ductwork through walls or fittings, the trade performing the work shall notify the Contractor so that proper provisions can be made for same. Each trade shall furnish and set all inserts, sleeves, hanger supports, etc. required for its work and shall be responsible for their proper and permanent location.

C. All piping and ductwork exposed to view shall be run generally parallel with the lines of the building and as close to walls and column as may be practical and consistent with proper grade and the maintenance of proper clearances for access to all parts requiring servicing.

D. The Contractor, in the prosecution of the work, shall do no cutting of woodwork, masonry, concrete or other materials after same have been installed, without the written permission of the Engineer. No waterproofing shall be cut for any purpose except on written approval of the Engineer.

3.02 FIELD QUALITY CONTROL

A. Upon completion of structural work as well as installation and adjustment of equipment in a manner satisfactory to the Engineer, the Contractor with his own forces, including such equipment and other experts as may be necessary (hereinafter collectively referred to as "Contractor's Personnel") shall place equipment in operation.

- B. Give the Owner at least seven days written notice prior to placing equipment in operation.
- C. Operating procedures during said period are subject to Engineer's approval.
- D. Operation of equipment prior to satisfactory completion of Performance Tests is the Contractor's complete responsibility.

3.03 MANUFACTURERS REPRESENTATIVE SERVICES

- A. The attached schedule outlines the various items of equipment specified in other sections and lists the responsibilities of the equipment manufacturer for each Section of the specifications.

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SCHEDULE OF EQUIPMENT TESTING AND MANUFACTURER'S SERVICES

EQUIPMENT ITEMS	SPEC. SECTION	PERF. AFFIDAVIT	SHOP TESTS	FIELD TESTS	INST. CERT.	SERVICES OF MFG. REP.			WRITTEN INSTRUCTIONS
						INSTALLATION DAYS	FINAL ACCEPTANCE DAYS	INSTRUCT. DAYS/FOLLOW UP VISITS	
Internal Recycle Pump	11300	Yes	No	Yes	Yes	½	½	½	Yes
Air Diffusers	11236	Yes	No	Yes	Yes	½	½	0	Yes
Submersible Mixers	11315	Yes	No	Yes	Yes	½	½	½	Yes
Hoists and Cranes	14300	Yes	No	Yes	Yes	½	0	½	Yes
Blower for DIP Tank	11380	Yes	No	Yes	Yes	0	½	½	Yes
Waste Backwash PS	11308	Yes	No	Yes	Yes	1	1	1	Yes
Waste Backwash Settling Tank	13100	Yes	No	Yes	Yes	1	½	½	Yes
Sewage Magnetic Flow Meters	13400	Yes	No	Yes	Yes	½	½	½	Yes

*** END OF SECTION ***

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DIVISION 11 – EQUIPMENT

SECTION 11200

PIPING, VALVES AND APPURTENANCES

PART 1 - GENERAL

1.01 DESCRIPTION

A. Description of Work: Contractor shall furnish and install piping systems complete with valves and other appurtenances as shown on the Drawings and in accordance with this Specification. This includes, but is not limited to, air piping, gravity flow yard piping, pressure flow yard piping, water and wastewater treatment process piping and force mains.

B. Related Work Specified Elsewhere:

1. Section 01300: Submittals
2. Section 02221: Utility Excavation, Backfill and Compaction
3. Section 02401: Dewatering
4. Section 09900: Painting – Process Equipment and Tanks
5. Division 11: Equipment, where applicable
6. Section 15060: Pipe Supports and Hangers

C. Piping Schedule:

<u>Type of Service</u>	<u>Type of Pipe</u>	<u>Type of Joints</u>
Air Piping -Interior/Exterior	Stainless Steel	Flanged/Welded
Water/Wastewater, Settled Waste Backwash, Internal Recycle Interior/Exterior	DIP	Push-On (Restrained/Mechanical Joint/Flanged)
Settled Waste Backwash and Overflow Non-Buried	SCH-80 P.V.C.	Solvent Weld
Waste Backwash Sludge	Glass-Lined DIP	Restrained/Mechanical Joint/Flanged

1.02 QUALITY ASSURANCE

A. Reference Standards:

1. American Society for Testing and Materials:

- a. ASTM A47, Malleable Iron Castings.
- b. ASTM A48, Gray Iron Castings.
- c. ASTM C700.
- d. ASTM D2241.
- e. ASTM F477.
- 2. American Water Works Association:
 - a. AWWA C100, Cast Iron Pressure Fittings.
 - b. AWWA C504, Rubber Seated Butterfly Valves
 - c. AWWA C508, Swing-Check Valves for Waterworks
 - d. AWWA C509, Resilient Seated Gate Valves
 - e. AWWA C600, Installation of Ductile Iron and Their Appurtenances.
 - f. AWWA C606, Grooved and Shouldered Joints.
 - g. AWWA C900, Polyvinyl Chloride Pressure Pipe, 4 In. through 12 In. for Water.

1.03 SUBMITTALS

- A. Shop Drawings and Product Data. Furnish completely dimensioned shop drawings, cuts or other data as required to provide a complete description of valves and piping specialties as specified.
- B. Contractor will be required to submit complete dimensional layouts of interior and exterior piping systems for approval. These layouts must be coordinated with equipment and valves to be furnished.
- C. Certifications: The Contractor shall submit certifications for pipe, fittings, linings, and materials to the Engineer for approval. Certifications shall state that pipe furnished complies with standards specified herein.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Packing Lists: Packing lists shall accompany each pipe delivery made to the site. Absence of such list may cause refusal of shipment.
 - 1. Packing lists shall indicate customer's order number or contract number, truck routing, type and classes of pipe, pipe diameters, weights and lengths of pipe, date of manufacturer, plant identification of the particular lots of piping contained in the shipment.
 - 2. Submit a copy of packing lists to the Inspector or Engineer as soon as practicable after delivery of piping.
- B. Handling: Exercise care not to damage exterior coatings and linings of pipes during loading and unloading operations.
 - 1. Use lifting devices or harnesses of the type recommended by pipe manufacturers in handling pipes.

2. Do not drop pipe and pipe fittings, valves and appurtenances.

C. Storage: Store pipe, fittings, valves and appurtenances so as not to contact earth or other contaminants.

PART 2 - PRODUCTS

2.01 DUCTILE IRON PIPE AND FITTINGS

A. Pipe:

1. Process piping and force mains, indicated on the drawings as ductile iron pipe, shall have flanged, grooved mechanical joint, or push-on joint ends of the sizes shown on the Contract Drawings, or as specified herein. The jointed sections of the piping shall be so placed as to allow maintenance and to permit units and equipment connected to the piping to be removed without disturbance to the main piping systems.
2. All ductile iron pipes shall be manufactured in accordance with the standards of ANSI/AWWA C151/A21.51 and ANSI/AWWA C150/A21.50. Ductile iron pipe shall be not more than 20 feet in length.
3. All underground ductile iron pipes shall be furnished with mechanical joint end design conforming to ANSI/AWWA C111/A21.11 or push-on joint ends. All joints within 25 feet of any change in horizontal or vertical alignment or tank structure shall be furnished with ductile iron retainer glands.
4. All above ground ductile iron pipes shall be furnished with flanged joint end design conforming to ANSI/AWWA C115/A21.15 and ANSI B16.1, faced and drilled 125# standard.
5. The nominal thickness of all ductile iron pipe shall not be less than ANSI/AWWA C151/A21.51 Class 50 for mechanical joints and Class 53 for grooved and flanged joints.
 6. Ductile iron pipe/pipe system shall be furnished by Griffin Pipe, American Cast Iron Pipe Company, U.S. Pipe and Foundry, or equal.

B. Fittings:

1. All fittings and specials for ductile iron pipe shall be made of cast iron or ductile in accordance with ANSI/AWWA C110/A21.10 and/or ANSI/AWWA C153/A21.53.
2. Fittings and specials for underground ductile iron pipe shall be provided with mechanical joint ends or push-on ends, furnished in accordance with ANSI/AWWA C111/A21.11, except where otherwise indicated on the drawings or required by the pipe, valves or other materials being placed or installed.

3. Fittings and specials for exposed ductile iron pipe shall be flanged in accordance with ANSI/AWWA C110/A21.10 and ANSI B16.1 faced and drilled 125# standard, or grooved in accordance with AWWA C606, except where otherwise indicated on the drawings or required by the pipe, valves or other materials being placed or installed.
4. Restrained Joints: Mechanical joint restraints shall be wedge type. Furnish Megalug as manufactured by EBAA Iron, Gripper Gland as manufactured by U.S. Pipe, or equal. Set screw retainer glands will not be permitted.
5. Grooved End Joints: Provide grooved end joints in accordance with applicable sections of AWWA C606.
6. Flange Adapters: Flanges shall be drilled to meet ANSI B16.1 125# standard. Flange material shall be ductile iron meeting ASTM A536 Grade 65-45-12. The Gasket shall be EPDM suitable for wastewater. Set screws shall be AIAI 4140 Steel-tensile 190,000 psi minimum, heat traced to Rockwell C42-50 and zinc plated for corrosion resistance. Flange adapter shall be Uni-Flange Series 400 or equal.
7. All hardware provided for buried connections shall be 316 stainless steel.

C. Pipe Coatings:

1. The interior of cement lined ductile iron pipe and fittings shall be sealed with a bituminous seal coat per ANSI/AWWA C104/A21.4.
2. The exterior surface of all ductile iron pipe and fittings for underground and unexposed locations shall be asphaltic coated - minimum of 1.0 mils dry film thickness per ANSI/AWWA C151/A21.10
3. The exterior surfaces of all ductile iron pipe and fittings for interior exposed installation shall be shop coated with a universal primer suitable for finish painting after installation in accordance with Section 09900.
4. The interior of waste backwash sludge piping shall be glassed-lined conforming to ASTM B 1000-21.

2.02 STAINLESS STEEL PIPE AND FITTINGS (AIR PIPING)

A. Stainless steel piping shall meet the requirements of ASTM A312/A312M, seamless, Grade 304L, Schedule 10S in accordance with the Contract Drawings with dimensions conforming to ASME B36.19M.

B. 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.

C. Fittings: Stainless steel fittings shall be of the same size and type specified under pipe.

D. Dielectric fittings or isolation joints shall be provided between all dissimilar metals.

2.03 SCHEDULE 80 PVC PIPE AND FITTINGS AND ACCESORIES

A. Pipe: Rigid polyvinyl chloride (PVC) used in the extrusion of Schedule 80 pipe shall be of Type I, Grade 1 compound as stated in ASTM D-1784. Schedule 80 PVC pipe shall fully meet or exceed the requirements of ASTM D1785 latest edition.

B. Joints: Socket type unless flanged joints are indicated on the Drawings. Socket fittings per ASTM D 2467, manufactured from Class 12454 B Rigid PVC compound and solvent per ASTM D 2564. Flanged fittings per ASTM D 1784, Schedule 80, 150 pound, manufactured from Rigid PVC compounds, with soft rubber full face flat type gaskets and stainless steel bolts.

C. Use Schedule 80 pipe with solvent weld fittings for Sch. 80 PVC pipe less than 3" in diameter, and flanged fittings for Sch. 80 PVC pipe 3" and greater in diameter.

D. Ball Valves: True (double) union type manufactured from schedule 80 PVC with Viton O-ring seals and self-lubricating Teflon seats, Nibco Chemtrol TUB series or equal.

E. Check Valves: True (double) union type manufactured from Schedule 80 PVC with Viton O-ring seals and self-lubricating Teflon seats. Shall function equally well in horizontal or vertical position. Supply Nibco Chemtrol TUC series or equal.

2.04 VALVES

A. General:

1. Provide valves of the same type and size range by same manufacturer; suitable for the intended service.
2. Markings shall be factory cast on the bonnet or body of each valve indicating manufacturer's name or mark, year of valve casting, size of valve, directional flow arrow and designation of working water pressure.
3. Valve pressure temperature ratings of not less than the design criteria applicable to system components.
4. Valves shall open to the left (counterclockwise). Valves shall be operated by nut, hand wheel, lever, floorstand, chainwheel or otherwise as indicated on the Drawings or specified herein. Operating nuts or wheels shall have cast thereon an arrow indicating the direction of opening.
5. Provide chain wheels and chains for operating overhead (5 feet or greater above finished floor) or inaccessible valves.
6. Valves buried or below floor shall be provided with stainless steel extension stem operators. Operating nut shall terminate no more than 6 inches below surface. The unsupported length of extension stems shall

not exceed 10 feet. Furnish valve position indicators and debris shield, as manufactured by Trumbull, for all buried valves.

7. For wrench operated valves, provide at least one wrench for each type and size valve except where valves are in convenient groups; supply one wrench for each four valves.
8. Valve ends shall be as indicated on the Drawings or specified herein and unless indicated otherwise shall conform to the following:
 - a. Grooved: AWWA C 606.
 - b. Flanged: ANSI B16.1 & AWWA C110/A21.10
 - c. Mechanical: ANSI/AWWA C111/A21.11
9. Valve flanges shall conform to ANSI B16.10, 125# and 250# Class as applicable.
10. Cast-iron valve material shall meet or exceed the requirements of ASTM A-126, Class B.

B. Valve Tags and Directory:

1. Provide valve tags for all valves.
2. Tags shall be made from a plastic laminate of heavy plastic with a brass eyelet in the corner and shall indicate the valve number and fluid in the pipe as provided by the Owner and/or Engineer.
3. Tags shall be fastened to each valve with a brass chain.
4. Tags to be made by Seton Name Place Company, New Haven Connecticut; W.H. Brady Company; or equal.
5. A preliminary valve directory shall be submitted by the Contractor prior to fabrication. A final valve directory shall be provided listing all valve numbers, the valve function, and location. The directory shall be typewritten and framed with a glass cover and delivered to the Owner after inspection and approval by the Engineer.

C. Check Valves:

1. Swing Check valves shall meet the requirements of AWWA C508.
2. Swing Check valves 2" in Diameter and Larger (Grooved or Flanged):
 - a. Designed for a minimum working water pressure or 150 psi.
 - b. Iron body, bronze mounted, full opening swing check type with bolted cover, stainless steel hinge and malleable iron clapper arm.
 - c. Disc of cast iron with bronze seat ring.
 - d. Valves less than 10 inches furnished with outside lever and weight.
 - e. Acceptable Manufacturers: Kennedy Valve Manufacturing Company, Inc.; Clow Corporation; or equal.

D. Plug Valves

1. General:
 - a. Valves shall be of the non-lubricated, eccentric type with resilient

faced plugs and shall be furnished with end connections as shown on the Drawings. Flanged valves shall be faced and drilled in accordance with the ANSI B 16.1 Class 125/150 lb. standard.

- b. All plug valves shall be furnished by one manufacturer.
 - c. The minimum port area thru the valve shall be at least 100% of the full pipe area.
 - d. Flanged Valves 6 inches and larger and all buried mechanical joint valves shall be gear operated to allow for proper plug orientation.
 - e. Valve bodies shall be of ASTM A-126 Class B cast iron in compliance with AWWA C507-73 Section 5.1. All exposed nuts, bolts, springs, washers, etc. shall be stainless steel or zinc plated.
 - f. Valve pressure ratings shall be as follows and shall be established by hydrostatic test as specified by ANSI B16.1.1967. Pressure ratings shall be 175 psi for valves through 12 inches. Valves shall be capable of providing drip-tight shut-off up to the full rating with pressure in either direction.
 - g. All plug valves shall be provided with a valve position indicator which can be read from the floor level.
 - h. Unless otherwise indicated or required, underground (buried) plug valves shall have mechanical joint ends or grooved ends. Provide stainless steel extension stem, valve box and cover for each valve. Operating nut shall be extended to within 6 inches of top of valve box. Underground valves shall be given a protective outside coating of coal-tar epoxy, minimum 75 percent solids by volume, to a dry film thickness of 8 mils minimum.
 - i. Plug valves shall be DeZurik, Pratt, or equal.
2. Plug:
- a. The plug shall be of one-piece construction and shall be capable of withstanding the full pressure rating of the valve in either direction without the use of structural ribs that extend beyond the profile of the plug.
 - b. The plug shall be covered with a resilient neoprene suitable for use in sewage, and no metal part of the plug shall be exposed to sewage.
3. Seats:
- a. Valves shall be furnished with corrosion resistant, non-ferrous metal seats which comply with AWWA C507-73, Section 7, Paragraph 7.2.
 - b. Seats shall be raised so that the plug does not come in contact with the iron body of the valve when the plug is in the closed position.
4. Bearings:
- a. Valve plugs shall be furnished with replaceable, sleeve type 300 series stainless steel or bronze bearings on the upper and lower journals.

- b. Bearings shall be designed not to exceed a stress of 1/5 of the compressive strength of the material used and the stress shall not exceed 2,000 psi.
- 5. Shaft Seals:
 - a. The plug shaft seal shall utilize a stuffing box and split pull-down packing gland, or other means.
 - b. The plug shaft seal shall be adjustable and completely replaceable without disturbing or removing the operator or actuator from the valve.
 - c. The plug shaft seal shall be capable of being replaced or repacked while under line pressure with the valve in the open position.
 - d. Any leakage thru the plug shaft seal shall be allowed to drain away from the valve and shall not be allowed to enter the operator.
- 6. Operators:
 - a. Manually operated plug valves 6 inches shall have extension stems and operating nuts. For valves located in horizontal pipes, the valve and operator shall be arranged such that when the valve is open, the plug shall be located above the horizontal centerline of the pipe.
 - b. Plug valves shall be provided with valve position indicators.

E. Butterfly Valves:

- 1. Water/Wastewater Service: Butterfly valves shall meet or exceed AWWA C504, cast iron body, neoprene rubber seated. The mating material for the resilient seat shall be stainless steel, 150 psi pressure rated.
- 2. Valve Position Indicator: Notch-plate level throttling handles for valves 6-inch size and smaller where applicable.
- 3. Valve shall be equipped with an electric actuator to respond to a signal from a level sensor located in the effluent wet well.
- 4. The electric actuator shall have the following features:
 - a. Output torque range 300 to 18,000 lb-in.
 - b. Voltage: 120V 60 Hz, 1-phase.
 - c. Motor: 120V, 1-phase reversible
 - d. Switch: 2spdt mechanical switches standard
- 5. The electric actuator shall be Series 70 manufactured by Bray to match existing actuators at the water treatment plant or equal.
- 6. Butterfly valves shall be manufactured by:
 - a. Water/Wastewater Service: Bray MK Series, Dezurik BOS-CL or equal.
 - b. Process Air Service: Bray MK Series, Dezurik BOS-CL, or equal.

F. Knife Gate Valve:

- 1. Knife gate valves shall be bonnetless, wafer type gate valves made with a cast iron body. Port areas shall be 100% of the full pipe area throughout the entire length. The valve shall meet MSS SP-81 face to face

dimensions. Flanges shall meet ANSI B16.10 150# standard. Packing shall be capable of being replaced without removing valve from line. The flush port area will be located in the base of the valve, and will be drilled, tapped and plugged.

2. All valves shall have two full-port elastomer cartridge seat halves which shall be supported and compressed between the flanges. The seat halves will be steel reinforced molded rubber and shall act as wiper blades to clean the gate as it strokes. The seats shall provide bi-directional sealing.
3. Packing box will be of the inverted type, compressed by a weir cast into the valve body. 3 layers of packing material shall be supplied as standard.
4. The gate shall be of sufficient thickness to protect against permanent deformation at 1.2 times the rated working pressure. The gate shall be ASTM A240 T-316 stainless steel. The stem nut shall be ASTM A276 T-304 Stainless Steel and shall have single pitch acme threads. The stem nut will be acid resistant bronze.
5. Valves shall be of rising stem type with handwheel actuator.
6. Valves shall be manufactured by Red Valve, Dezurik, or equal.

G. Gate Valves:

1. 4" and larger
 - a. Gate valves shall be iron body, bronze mounted, resilient seated wedge type in accordance with AWWA C509 and these specifications.
 - b. Valve bodies and bonnets shall be cast iron. Valve hand wheels, stuffing boxes and wedges shall be ductile iron, ASTM A536. The wedge shall be fully encapsulated with synthetic rubber for the resilient seat. The wedge shall be symmetrical and seal equally well with flow in either direction. There shall be no exposed metal seams, edges or screws within the waterway when the valve in the fully closed position. Tongue and groove guides shall be provided on the sides of the gate and in the body to keep the gate centered between the seats throughout its length of travel.
 - c. Valve stems shall be bronze in full compliance with Section 4.7 of AWWA C509. Design of the stuffing box shall permit repacking while valve is fully open and under line pressure.
 - d. Valve interior and exterior shall be fully epoxy coated in compliance with AWWA C550.
 - e. All gate valves shall be rated for 200 psi working pressure.
 - f. Unless otherwise indicated or required, valves for above ground ductile iron pipe shall have flanged ends in accordance with ANSI B16.1, Class 125. Provide hand wheel operators.
 - g. Acceptable Manufacturer: Mueller 2360 Series, American Flow Control Series 2500 NRS; or approved equal.

H. Pinch Valve for Flow Control:

1. 6-Inch at Effluent Wet Well.
 - a. Pinch valve shall be ductile cast iron, fully enclosed, split body, interior and exterior shall have corrosion resistant fusion bonded epoxy coating.
 - b. Face-to-face dimensions should be interchangeable with gate valves and flange drilling taped for ANSI#150.
 - c. Single cone funnel shaped sleeve, centerline closure, natural rubber sleeve.
 - d. Valve interior and exterior shall be fully epoxy coated in compliance with AWWA C550.
 - e. Valves shall be rated for 150 psi working pressure.
 - f. Handwheel operated with position indication standard.
 - g. Acceptable Manufacturers: RF Valve, Pratt Industries or Red Valve or equal.

2.05 MISCELLANEOUS APPURTENANCES

A. Valve Boxes:

1. Valve boxes shall be cast iron, screw type, with 5 1/4 inch shaft and extra deep lid, having the word "water", "sewer" or "sludge", as appropriate, cast thereon. Valve boxes shall be 3 piece type.
2. Boxes shall be adjustable within the limits necessary to provide for the setting depths required and shall have base sizes adequate for the valves to be covered.
3. Boxes shall be as manufactured by Mueller Company, or equal.
4. The valve box shall be carefully placed and set at right angles to the main. The valve box shall not transmit shock or stress to the valve and shall be centered and plumb over the wrench nut of the valve with the box cover flush with finished grade. (The flange at the bottom of the top section shall rest upon planks which shall extend into solid ground on each side of the trench for a minimum of 8 inches). In tamping the backfill around the valve, special care shall be taken to avoid settlement.

B. Wall Castings and Sleeves:

1. Wall pipes shall be cast iron for sizes and connections of pipe types as indicated on the Contract Drawings, with center flanged water stop cast integral with the pipe barrel to be cast into the concrete at the mid point. Unless specifically indicated otherwise, each end of the wall pipe shall protrude a sufficient distance from each face of the finished concrete into which it is cast to allow adequate clearance for tools, bolts and nuts required to complete the type of pipe connection indicated. Wall pipes shall be rated for a working pressure of 250 psi.

2. Wall sleeves and floor sleeves in cast-in-place concrete shall be fabricated from Schedule 10 black steel pipe with a welded 2-inch-wide intermediate anchoring flange of 3/16 inch steel midway on the sleeve or provide sleeve product similar to Fig. 204 as manufactured by F&S Manufacturing Corporation, or equal. Pipes within wall sleeves shall be sealed with Link-Seal by Thunderline Corp., or equal, with stainless steel nuts and bolts. Pipes within floor sleeves shall be sealed with oakum and lead.
3. Ductile iron wall castings shall be furnished by U.S. Pipe and Foundry Company, American Cast Iron Pipe Company, or equal.

C. Pipe Couplings:

1. Unless otherwise indicated, ductile iron pipe couplings shall be made with a Style 38 coupling as manufactured by Dresser Manufacturing Division, Rockwell Product Number 411, or equal.
2. The sleeve type couplings shall be designed to fit accurately the outside diameters of the pipe which they are to connect. Couplings shall be furnished complete with bolts, nuts, and gaskets. Gaskets shall be of molded rubber, Dresser plain Grade 27, or equal. Middle rings for couplings used on ductile iron pipe shall be at least 3/8 inch thick. Middle rings shall be not less than 7 inches wide. Couplings shall be installed in strict accordance with the manufacturer's recommendations.

D. Cleanouts:

1. Provide cleanouts where shown constructed of the same materials specified for the pipelines and fittings to be connected.
2. Provide watertight, leak proof plug or cap at the end of the riser. Provide cast iron frame and cover over riser pipe suitable for use in paved, traveled roadways.

E. Wall Seal:

1. Hydrostatic seal designed to seal opening between pipes and a true wall opening. Use Link-Seal by Thunderline Corp. or equal. Caulking, mastic sealants, lead/oakum are not equal.

F. Flexible Coupling:

1. Flexible coupling shall consist of an inner tube, body and outer cover and shall have flanged ends.
2. Body shall consist of fabric and rubber compounds reinforced with steel wire for strength.
3. Body materials shall be compatible with the tube and suitable for the specified service conditions.

4. Couplings shall be of arch type and must have a cover formed from rubber suitable to external service.
5. Furnish Red Valve Co. Redflex Type J-1, General Rubber Co. Style 1015 Maxi-Joint or equal.

G. Dismantling Joints:

1. Dismantling joints shall be Style 131 as manufactured by Dresser or equal.

2.06 HEAT TRACING AND PIPE INSULATION

A. Waste Backwash Sludge Piping

1. Exposed waste backwash sludge piping, fittings and valves shall be heat traced and insulated, where shown in the Contract Drawings.

2.07 PIPE SUPPORT AND ANCHOR MATERIALS

A. Concrete Inserts:

1. Where piping is supported from the concrete structures, use inserts made of carbon steel ASTM A 36 or malleable iron ASTM A 47.
2. Where the pipe load exceeds the recommended load for the inserts, use two inserts with a trapeze type connecting member below the concrete.

B. Hanger Rods:

1. Carbon steel conforming to ASTM A 576.
2. In no case shall hanger rods less than 3/8-inch diameter be used for support of pipe 2 inches and smaller, or less than 1/2 inch diameter rod for supporting pipe 2 1/2 inches and larger.

C. Base Supports:

1. For valves and pipe fittings shall consist of concrete bases or saddles supported by pipe columns.
2. Concrete Bases:
 - a. Conform to the miscellaneous detail on the drawings, if applicable.
 - b. Do not use concrete base supports where the distance from the floor to the bottom of the unsupported element exceeds five feet.
 - c. Concrete work as specified in Division 3 Concrete.
3. Saddles:
 - a. Shall consist of ITT Grinnell Figure 258, or equal, Cast-Iron Pipe Saddle Support and pipe column designed to adequately support the applied loads with a steel base bolted to the floor and set on a

- one inch thick grout bedding.
- b. Consideration will be given to pipe saddles fabricated by the Contractor equal to ITT Grinnell Figure 258, or equal.
- c. Install saddles supported by pipe columns where hangers cannot be utilized.

D. Riser Clamps:

1. Support vertical runs of piping at each floor, or closer where required, with carbon steel clamps ASTM A 36 bolted around pipes and attached to the building construction.
2. Use copper plated clamps for copper tubing support.
3. Use two bolt type clamps designed for installation under insulation on insulated pipe runs.

E. Hangers:

1. Hangers fabricated malleable iron ASTM A 47 or carbon steel ASTM A 36.
2. Use coated or plated hangers to isolate steel hangers from dissimilar metal tube or pipe.
3. Hangers for piping 2 1/2 inches or larger shall incorporate a means of vertical adjustment after erection while supporting the load.
4. Adjustable Bank Hangers: Use carbon steel band type hangers designed for suspension on hanger rods with provisions for vertical adjustments and locking in position using supporting and locknuts. Use band hangers to support non insulated pipe.
5. Clevis Hangers for Insulated Pipe: Use carbon steel yoke and U strap type hanger designed for installation under insulation with cross bolt outside the insulation.

F. Brackets: Where piping is run adjacent to walls or steel columns, use welded steel brackets ASTM A 36.

G. Auxiliary Steel: Steel shapes used for installation of pipe hangers and supports shall conform to Miscellaneous Metal as specified in Section 05500 -METAL FABRICATIONS.

H. Stainless Steel Anchors and Supports: AISI Type 304 stainless steel conforming to ASTM A 167 with No. 1 Finish.

I. Fasteners: Use types specified herein as best suited for anchoring auxiliary steel, miscellaneous metal supports, and pipe supports into structure materials at intended point of installation.

1. Screw Type Expansion Anchors: Fed. Spec. FF 325.
2. Self tapping Screws: Fed. Spec. FF 107C(2).

3. RAWL PLUGS NOT PERMITTED.
4. Anchoring devices for fastening into solid masonry or concrete shall conform to Fed. Spec. FF 325 Group II, Type **3**, Class 3 for sleeve type anchors: McCulloch KWIK BOLT, Molly PARABOLT, Phillips RED HEAD Anchors, or equal.

2.08 EARLY WARNING TAPE

A. Provide detectable aluminum foil plastic-backed tape or detectable magnetic plastic tape manufactured specifically for warning and identification of all buried piping. Tape shall be detectable by an electronic detection instrument. Provide tape in rolls, 2 inches minimum width, color coded for the utility involved, with warning and identification imprinted in bold black letters continuously over entire tape length. Warning and identification shall be CAUTION BURIED NON-POTABLE LINE BELOW or similar. Use permanent code and letter coloring unaffected by moisture and other substances contained in trench backfill material. Bury tape with the printed side up at a depth of 12 inches below the top surface of earth or the top surface of the subgrade under pavements.

PART 3 - EXECUTION

3.01 PREPARATION

A. Field Measurement:

1. The Drawings are in general indicative of the work, with symbols and notations for clarity. However, the drawings are not an exact representation of all conditions involved, therefore, layout piping to suit actual field measurements. No extra compensation will be made for work due to differences between indicated and actual dimensions.
2. Submit details of proposed departures necessitated by field conditions or other causes to the Engineer for approval.

3.02 INSTALLATION (PIPING)

A. General:

1. Clean piping prior to installation and following installation to prepare for painting. Keep open ends of piping and pipe attachment openings on equipment capped or plugged until actual connection.
2. Construct piping from full lengths of pipe using short sections only for runs of less than full pipe length. Make changes in direction of pipe runs with fittings only.

3. Cut pipe accurately to measurements established in the field and assemble in place without springing, forcing, excessive cutting or weakening of the structure.

B. Exposed Piping:

1. Run piping parallel or perpendicular to the lines of the structure. Keep piping a sufficient distance from other work to permit clearance of not less than one inch between the piping or insulated piping and adjacent work. Install piping as close as possible to walls, overhead construction, columns, and similar to facilitate insulating work and removal of piping later.
2. Run piping to compensate for structural interferences, to preserve headroom, and not to interfere with openings, passageways and equipment.
3. Do not install piping with joints and fittings over motors, switchboards, panels, or similar electrical apparatus.
4. Install unions and flanges in accessible locations and where indicated or not, install union adjacent to all equipment and wherever removal of equipment for repair or replacement is required. Use dielectric unions at points of connection of copper tubing and piping to ferrous metal piping or equipment.

C. Underground Piping:

1. Perform trenching as specified previously in Section 02221 - UTILITY EXCAVATION, BACKFILL AND COMPACTION.
2. Unless indicated otherwise, piping outside of structures shall be installed with not less than 3'0" of cover.
3. Keep trenches dewatered until pipe joints have been made and concrete bedding and blocking, if any, have hardened. Under no circumstances lay pipe in water or on subgrade containing frost.
4. Rest each section of pipe on pipe bedding for the full length of its barrel, with recesses excavated for pipe bells so joints can easily be made. Backfill recesses with bedding material immediately following pipe joining operations.
5. Take up and relay pipe that is not laid true to required alignment or grade or has its joints disturbed after laying. No deviation from the required line and grade permitted, except with approval of the Engineer.

D. Pipe Joining:

1. General: Exercise care when making pipe joints and make joints in accordance with the pipe material manufacturer's recommendations and the following requirements. In each instance of pipe joining, those portions of pipes involved must be absolutely clean just prior to assembly.

If a joint is extremely difficult to assemble or sealing is not affected, disassemble the joint and correct the difficulty if possible. Remake the joint using new materials when necessary.

2. Mechanical Joints: To make ductile iron pipe mechanical joint, position sealing gasket and gland for bolting and enter the spigot into pipe bell end until joint line is visible. Tighten bolts evenly maintaining approximate distance between gland and face of flange at all points around the socket. Do not exceed pipe manufacturer's specifications for maximum torque applied to bolts.
3. Grooved End Joints: Pipe ends shall be clean and free from indentations, projections and roll marks in the area from pipe end to groove for proper gasket sealing. The gasket style and elastomeric material (grade) shall be verified as suitable for the intended service as specified. Gaskets shall be molded and produced by the coupling manufacturer. See the latest copy of the Victaulic Field Assembly and installation instruction pocket handbook (I-300). All castings used for coupling housings, fittings, valve bodies, etc., shall be date stamped for quality assurance and traceability.
4. Flanged Joints: Make ductile iron and steel pipe joints faced true, fitted with gaskets, and drawn up square and tight to insure full pipe flow and satisfactory seal.
5. Threaded Joints: Cut pipe ends square, deburr and ream to size of original bore. Cut threads to American Standard tapered pipe threads, free of oil and cuttings. Use an approved joint tape or joint paste to aid in joint lubrication and sealing. After fabrication, paint exposed threads.
6. Soldered Joints: Cut tubing and piping ends square using a fine hacksaw blade or tube cutter, deburr and ream to size of original bore. Prior to sweating, clean pipe ends and fittings surfaces involved in the joint, to bright metal without marring surfaces using steel wool, sand cloth or steel wire brush. Apply flux evenly and liberally to the outside end of the pipe and the inside of the outer end of the fitting until all surfaces are completely covered. Piping shall be slipped together and reworked to insure even flux distribution. Solder amount shall be per manufacturer's recommendations. Solder joints shall be made using direct torch flame. Finished joints shall show no evidence of hard temper due to over heating, no evidence of improper solder draw, and excess solder must be removed. Joints in compressed air systems shall be made with silver brazing alloy.
7. Flared Joints: Cut tubing and piping ends square, deburr and ream to size of original bore. Finished joints shall show evenness of flaring and proper seating of joining parts.
8. Butt Fusion: Sections of polyethylene pipe should be joined into continuous lengths on the jobsite above ground. The joining method shall be the butt fusion method and shall be performed in strict accordance with the pipe manufacturer's recommendations. The butt fusion equipment used in the joining procedures should be capable of meeting all conditions recommended by the pipe manufacturer, including, but not limited to,

temperature requirements of 400 degrees Fahrenheit, alignment, and an interfacial fusion pressure of 75 PSI. The butt fusion joining will produce a joint weld strength equal to or greater than the tensile strength of the pipe itself. All field welds shall be made with fusion equipment equipped with a McElroy Data Logger. Temperature, fusion pressure and a graphic representation of the fusion cycle shall be part of the quality control records.

E. Field Touch up of Pipe Coating:

1. Prior to placement of coated pipe touch up chipped, cracked or abraded pipe surfaces with two coats of the previously specified coating material.
2. Bring coating materials for field touch up to job site in original sealed and labeled containers.
3. Contractor shall submit to the Engineer, immediately upon completion of field applied coating, certification from the manufacturer indicating that the quantity of each coating purchased was sufficient to properly coat all surfaces.
4. In addition to field touch up of pipe surfaces, thoroughly cover completed pipe joints with pipe coating material.

F. Plug Valves: All plug valves shall be installed so that the plug is in the upper quadrant of the valve body in the open position. The plug shall rotate downward to close.

G. Marking Pipe and Fittings: Each length of pipe and each fitting shall be marked with the weight, class or nominal thickness, and casting period cast upon them. Each length of pipe and each fitting shall be marked with the manufacturer's identification and year of manufacture in a conspicuous location. Ductile iron pipe shall have the letters "DI" or "Ductile" cast or stamped on the pipe. All required markings shall be clearly legible.

H. Testing:

1. The Inspector or Engineer shall be notified in advance of all tests, and all tests shall be conducted to his entire satisfaction.
2. All ductile iron piping shall be tested with water at 100 psi and shall retain this pressure over a period of two hours without leakage.
3. Prior to pressure testing, take the following precautions:
 - a. Free piping of trapped air prior to testing.
 - b. Do not subject equipment, piping specialties or plumbing fixtures to test pressures.
 - c. Isolate all such items in lines that may be damaged by test pressures.
 - d. Maintain test pressure to within 3 psi of initial test pressure, without introduction of additional pressure, until a visual examination is

- made of every joint and connection, but in no case less than 4 hours actual test time.
4. Drain and Vent System Tests:
 - a. Hydrostatic at not less than 10-foot head of water, except when danger of freezing, then conduct tests with air pressure.
 - b. Air Test: Introduce compressed air in any suitable opening, after closing all other inlets and outlets, until there is a uniform gauge pressure of 10 psi. Maintain pressure without introduction of additional air for a period of at least 15 minutes.
 5. Air Piping - Air Testing:
 - a. Pressurize the entire air systems between the blower discharge and all valved outlets to 25 psig with compressed air. With the system under pressure, check each joint and connection by painting with soapy water. Remove and renew cracked pipe, fittings, and valves indicating leakage. Retest.
 - b. Slowly increase the system pressure to 50 psig. Allow one hour for the system to stabilize; then re-adjust the system pressure to 50 psig. Record this gauge reading and start the test.
 - c. For the system to pass the test, it must maintain 50 psig for a minimum of 2 hours with no drop in pressure.
 - d. Soap test joints, fittings, and valves while the system is under test pressure. Correct all leaks and retest as often as necessary until satisfactory results are achieved.
 6. Leaks and defects shall result in the pipe being repaired, replaced or otherwise remedied by the Contractor at no expense to the Owner and to the complete satisfaction of the Engineer. Repair or replacement of pipe shall be accomplished when leaks become apparent and shall be completed within one month after detection of leak but prior to Owner's final acceptance of the project.

3.03 DEFECTS TO BE MADE GOOD

A. If, at any time before the expiration of the guarantee period under this contract, any broken pipe, humps, sags, settlements, bellies, or any other defects are found in any of the lines or in any of the appurtenances, the Contractor shall cause the same to be removed and replaced by proper material and workmanship, without extra compensation for the labor and material required, even though such injury or damage may have been due to any act, default, or negligence on the part of the Contractor. All materials shall be carefully examined by the Contractor for defects prior to installation, and any found defective shall be rejected for use.

*** END OF SECTION ***

DIVISION 13 – EQUIPMENT

SECTION 11236

AIR DIFFUSERS

PART 1 - GENERAL

1.01 DESCRIPTION

A. The work to be performed under this Section includes furnishing materials, equipment, certification of installation and testing for the fine bubble disc diffuser aeration systems as shown on the drawings and specified herein.

1.02 SUBMITTALS

A. Submit the following:

1. Drawing showing the dimensional layout plan and design of replacement aeration diffuser system.
2. Submit a detailed drawing showing plans, elevations and appropriate cross sections of the piping, diffusers and anchor locations. These drawings must show pipe sizes and lengths, distances between air distribution headers, connections to existing piping and the location of diffusers, supports, and expansion joints.
3. Provide component details including equipment data sheets of the aeration equipment showing diffusers, diffuser holders, retainer rings, floor supports, wall supports, pipe connections, and moisture removal connection.

B. Submit shop drawings and product data and samples per Section 01300.

C. Submit operation and maintenance manuals for aeration diffusers per Section 01300 when the materials are delivered onsite.

D. Submit manufacturer's certificate for diffuser system after testing per Section 01300 when the aeration system has been installed by the Contractor.

E. Testing Plan – Provide detailed plan for testing the replacement diffusers prior to returning the tank to service. The County shall provide clean water for testing aeration systems, Contractor shall be responsible for filling and draining the tank as necessary.

1.03 MANUFACTURERS

A. Xylem, Sanitaire Disc Diffusers or equal

1.04 WARRANTY

A. The requirements of the general conditions, supplementary conditions and special provisions shall apply.

B. The manufacturer shall guarantee all equipment furnished to be free from defects in materials and workmanship under normal use and service for a period of twenty-four months after testing and certification.

PART 2 - PRODUCTS

2.01 DESIGN CONDITIONS

A. The aeration tanks are configured as follows (dimensions in feet):

Tank/Pass	Length	Width	SWD	Grids	Diffuser s/Pass	Holders/ Pass
Aerobic Zones	20	13.8	16	3	84	84
		Tank Total		3	84	84
		Tank Count			2	
		Project Total		6	168	168

B. Design aeration system to transfer not less than the following pounds of oxygen per day in clean water at 14.7 PSI, 20C and zero dissolved oxygen at the specified submergences, air rate and pressure.

	Std. O2 Transfer Rate (SOTR)	Volumetric Air Flow	Operating Pressure At top of Drop	Diffuser Submergence	SOTE
	lb/day/tank	scfm/tank	psig	ft	%
Average Day	888	109	7.2	15.19	32.4
MM	1064	134	7.2	15.19	31.7
Max Day	1775	238	7.6	15.19	29.8

- C. Design air distributors with centerline spacing not to exceed 4 feet to maximize oxygen transfer efficiency and mixing efficiency to minimize solids deposition between air distributors.

2.02 MATERIALS, FABRICATION AND FINISHING

A. Stainless Steel – Pipe, Fittings and Supports

- 1 Fabricate all welded parts and assemblies from sheets and plates of stainless steel with a 2D finish conforming to ASTM A240, 554, 774, 778.
- 2 Fabricate non-welded parts and flanges from sheets, plates or bars of stainless-steel conforming to ASTM A240 or ASTM A276.
- 3 Welds & Welding Procedure
 - (a) Weld in the factory with ER 316L filler wire using MIG, TIG or plasma-arc inert gas welding processes. Provide a cross section equal to or greater than the parent metal.
 - (b) Provide full penetration butt welds to the interior surface with gas shielding of interior and exterior of joint.
 - (c) Continuously weld both sides of face rings and flanges to eliminate potential for crevice corrosion.
- 4 Corrosion Protection and Finishing: Clean all welded stainless-steel surfaces and welds after fabrication by using the following procedure:
 - (a) Pre-clean all outside weld areas to remove weld splatter with stainless steel brushes and/or deburring and finish grinding wheels.
 - (b) Finish clean all interior and exterior welds and piping by full immersion pickling and rinse with water to remove all carbon deposits and contaminants to regenerate a uniform corrosion resistant chromium oxide film per ASTM A380 Section 6.2.11, Table A2.1 Annex A2 and Section 8.3.
 - (c) Corrosion protection techniques not utilizing full immersion methods are unacceptable and will be cause for rejection of the equipment.

- B. Natural Rubber – Furnish all fixed and expansion joint O-ring gaskets of natural rubber/SBR with a Shore A durometer of 45 ± 5.

C. Polyvinyl Chloride (PVC) – Pipe and Fittings

- 1 Produce PVC pipe and fittings from PVC compound with a minimum tensile strength of 7000 psi.
- 2 Provide lower drop pipe, manifold and air distributors as follows:

<u>Diameter</u>	<u>Wall Thickness</u>	<u>ASTM</u>
4 inch	SDR 33.5	D3915, 3034,124524
6 inch & larger	Schedule 40	D1784, D1785, D2466,12454-B

- 3 Design air distributors and manifolds to withstand 130° F mean wall temperature.
- 4 Add two parts by weight of titanium dioxide per 100 parts of resin to PVC compounds for manifolds, air distributors, joints and PVC diffuser assembly components to minimize ultraviolet light degradation.
- 5 Factory solvent weld all PVC joints and fittings. Field solvent welding will NOT be permitted.

D. EPDM - Membrane Diffusers and Gaskets

- 1 Manufacture circular membrane diffuser discs with integral O-ring of EPDM synthetic rubber compound with precision die formed slits. Thermoplastic materials (ie plasticized PVC or polyurethane) are not acceptable.
- 2 Add carbon black to the material for resistance to ultraviolet light.
- 3 Design diffuser as one piece injection molded part with a minimum thickness of 0.080 inches for 9 inch diameter unit.
- 4 Limit the maximum tensile strength of the diffuser to 10 psi when operating at 2.4 SCFM/ft² of material. Furnish proportionately thicker material for larger diameter disc diffusers to limit the maximum tensile stress and to resist stretching.
- 5 Produce diffusers free of tears, voids, bubbles, creases or other structural defects.
- 6 Furnish diffuser material to meet the following:

Item	Value/Units	ASTM
Base Polymer	EPDM	D573
UV Resistance	Carbon Black	
Specific Gravity	1.25 or less	
Durometer – Minimum	58% ± 5%	D2240
Modulus of Elasticity	500 psi	D412
Ozone Resistance (72 hrs: 40°C pphm)	No cracks @ 2X magnification	D1171 Test A
Tensile Strength	1200 psi	D412
Elongation - % - Retained 70 hrs @ 100°C - minimum at break	75% Max 350%	D573 D412

- 7 Quality Control – Test diffuser using primary sampling criteria outlined in Military Standard 105E.
- 8 Membrane Longevity
 - (a) Longevity of the proposed membrane diffusers shall have been demonstrated in at least three full-scale municipal installations operating continuously for a minimum of three years.
 - (b) Test reports, prepared by an independent testing agency, shall confirm membrane longevity through

compliance with the following maximum allowed percent (+/-) change in each membrane property. Tests conducted in-house by the Supplier shall not be acceptable.

- (c) Data for a minimum of three diffusers from each installation shall be provided.

Property	Maximum Change
Durometer	5%
Weight	5%
Permanent Set	0.5%

2.03 SYSTEM COMPONENTS

- A. Drop legs - Provide a 316L stainless steel drop leg from the air main connection to the drop leg connection on the manifold.
1. Provide a Van Stone style flange with a 150 pound bolt pattern for the top connection.
 2. Provide a band clamp coupling with gasket for the lower drop leg to manifold connection.
 3. Provide a sway brace type of support for drop legs greater than 20ft long.
- B. Manifolds – Provide PVC manifolds for connection to the air distribution headers.
1. Fabricate manifolds with 4 inch diameter fixed threaded union or flanged joints for connection to the air distributors.
 2. Design manifold, distributor connections and supports to resist thrust generated by expansion/contraction of the air distributors over a temperature range of 125° F
 3. Support manifold with a minimum of two supports.
 4. Connect manifolds with fixed threaded union or flanged joints to prevent rotation or blow apart.
- C. Air Distributors and Diffuser Holders - Provide 4-inch diameter PVC air distributors perpendicular to the air manifold
1. Fabricate distributors with single PVC diffuser holders solvent welded to the crown of the air distributor for complete air seal and strength.
 2. Provide minimum solvent weld area of 15 square inches.
 3. Design distributors and holders to resist a dead load of 200 lbs applied vertically to the outer edge of the diffuser holder.
 4. Provide 4-inch diameter threaded removable end caps complete with gasket, threaded coupling and end plate for clean out at the end of each distributor.

- D. Air Distributor and Manifold Connection Joints
1. Join air distributor sections with positive locking fixed threaded union or flange type joints for all submerged header joints to prevent blow apart and rotation.
 2. Bell and spigot, slip on or expansion type joints are not acceptable for submerged joints.
 3. Design threaded union joints with spigot section connected to one end of the distribution header, a threaded socket section connected to the mating distribution header, an O-ring gasket and a threaded screw on retainer ring. Solvent welding shall be done in the factory.
 4. Fixed joints shall be designed to resist 80 ft-lb (5.5 kg-m) torque without joint movement or failure.
 5. All fixed joints shall have interlocking splines and grooves to prevent rotation of the air distributors. All rotational forces shall be transferred through the interlocking splines. Joints that require the o-ring to transfer rotational forces between the splines are not acceptable. If positive locking fixed joints are not used, all distributor connections shall be 125 lb flanges.
 6. Design flanged joints with a 125 lb drilling angle face ring, follower flange and stainless-steel hardware.
- E. Supports- Provide each section of manifold and air distributor with a minimum of two (2) supports.
1. Limit maximum support spacing to 8 feet.
 2. Design all supports to allow for thermal expansion and contraction forces over a temperature range of 125° F and to minimize stress build up in the piping system.
 3. Design supports to be adjustable without removing the air distributor from the support.
 4. Design supports to allow for complete removal from the tank, less the anchor bolt, to facilitate installation of additional headers and in-tank maintenance. Support structures which consist of rods Epoxied directly into the tank floor are not acceptable.
 5. Manifold Support – 6 inch diameter and larger
 - (a) Design supports to include hold down guide straps, support structure and anchor bolts.
 - (b)** Design guide straps with a 2 inch minimum width to eliminate point load on manifold and minimize binding.
 - (c) Design support for 2 inches plus or minus vertical adjustment for leveling of manifold.
 - (d) Attach supports to tank floor with two stainless steel anchor bolts.
 6. Air Distributor and Manifold Supports – 4 inch diameter.
 - (a) Design supports with hold down straps, support structure and anchor bolt.
 - (b) Design support for 1-1/2 inch (plus or minus) vertical

- adjustment for leveling air distributor to plus or minus 1/4 inch.
- (c) Guide support
 - i) Guide straps to have 1 1/2 inch wide top and bottom contoured bearing surface with chamfered edges to minimize binding and resistance to movement of air distributor under full buoyant uplift load.
 - ii) Design strap with 1/8 inch clearance around distributor so strap is self-limiting and cannot be over tightened.
 - (d) Fixed supports
 - iii) Fixed straps to have 1 1/2 inch wide top and bottom contoured bearing surface with punched burrs to positively grip the air distributor when tightened.
 - iv) Design strap to be self-limiting to prevent stressing the distributor if the clamp is over tightened.
 - (e) Attach air distributor supports to tank floor with one stainless steel anchor bolt. Attach manifold supports to tank floor with two stainless steel anchor bolts.
- F. Diffuser Assemblies - Furnish diffuser assemblies including diffuser with integral diffuser gasket, holder, retaining ring and air flow control orifice.
- 1. Membrane Diffuser
 - (a) Incorporate an integral check valve into the membrane diffuser.
 - (b) Design and test diffusers for a dynamic wet pressure (DWP) of 12 inches \pm 20% water column @ 1.0 SCFM/diffuser and 2 inches submergence.
 - (c) Visual Uniformity - Observe diffusers for uniform air distribution across the active surface of the diffuser at 1.0 SCFM and 2 inches submergence. Active surface is defined as the perforated horizontal projected area of the diffuser.
 - (d) SCFM defined at 20°C, 1 atm, 36% RH
 - (e) Quality Control – Test diffuser using primary sampling criteria outlined in Military Standard 105E.
- G. Anchor Bolts
- 1. Design anchor bolts for embedment in 4000 psi concrete with a pullout safety factor of 4.
 - 2. Provide a mechanical stainless steel expansion type anchor bolt system.
- H. Liquid Purge System - Provide a liquid purge system to drain the entire submerged aeration piping system for each aeration grid including airlift purge eductor line and manual control valve.

PART 3 - EXECUTION

3.01 EQUIPMENT MANUFACTURER'S SERVICE REPRESENTATIVE

A. Equipment Manufacturer's service representative shall be furnished in accordance with the following:

1. 1 Trip (8-hour start-up): The purpose of the trip shall be to provide a review and certification that all required materials and appurtenances are onsite and verbal instruction to the installing Contractor in following the installation instructions prior the start of the installation of the equipment.
2. Trips as requested by the Contractor to verify that installation is proceeding as required.
3. Trips as required by the Equipment Manufacturer to monitor successful installation of the equipment.
4. Trip to perform testing of the aeration diffuser system in accordance with the approved testing plan, prior to start-up.

B. A written report covering the technician's findings and installation approval shall be submitted to the Owner covering all inspections and outlining in detail any deficiencies noted.

3.02 SHOP OXYGEN TRANSFER TEST

- E. Conduct a performance test to demonstrate capability of the aeration equipment to meet the specified oxygen transfer requirements.
- F. Base all tests on the following criteria:
 - A. Two design conditions that the consultant engineer selects at each diffuser density will be tested. In the case of more than three densities on a project, the Engineer will define zones to be tested after award of the project.
 - B. A minimum of 3 test runs for each specified design condition to be run in complete accordance with ASCE Clean Water Test Procedure (2006 or latest edition)
 - C. Conduct tests in a full-scale aeration test tank (minimum of 300 sq. ft.) at the specified submergence and water depth with a diffuser density equivalent to the specified tank configuration. Diffuser density is defined as the ratio of the total tank surface area to the total active diffuser surface area.
 - D. Conduct shop test with air rate and mass rate of oxygen transfer directly proportional to the ratio of the shop test tank volume and the design tank volume.
 - E. Plot of standard condition pounds of oxygen transferred per day per 1000 cubic feet of tank volume versus standard condition cubic feet of air per minute per 1000 cubic feet of tank volume. (lbs-O₂/day/1000 cubic feet-tank) vs. (SCFM/1000 cubic feet-tank)

- 1 Standard conditions of oxygen transfer are defined as 68o F, 1 atmosphere ambient pressure, clean water.
- 2 Standard air is defined as 68 °F, 1 atmosphere, 36% R.H., containing 23% oxygen by weight.

- G. Certify and stamp all tests by a Professional Engineer.
- H. Include all costs for testing (exclusive of witnesses' expenses) in the equipment price. All tests may be witnessed at Owner/Engineer option. Cost of travel and living expenses for Owner/Engineer to be paid by the Owner.
- I. Submit all test data from oxygen transfer tests for approval by the Engineer prior to manufacturing equipment.

3.03 OPERATION AND MAINTENANCE MANUAL

- A. Three (3) paper copies with an electronic copy of the Operation & Maintenance Manuals shall be furnished during start-up. These manuals shall include maintenance instructions for all equipment provided.

3.04 FIELD SERVICES, START-UP AND TRAINING

- A. The services of the field representative shall include minimum three (3) days, exclusive of travel time, completed in one (1) travel trips. The services provided include verification of proper equipment installation and training of the owner's personnel. The Owner shall notify the manufacturer a minimum of ten working days prior to the time that the field services are desired.
- B. The Owner shall notify aeration equipment provider when the installation has been completed. A representative of the supplier shall inspect the installation. The Owner shall be advised in writing of any corrections or adjustments that are required for the equipment installation. After the installation has been completed to the supplier's satisfaction, a letter of certification that all equipment is installed in accordance with its instructions and that the equipment is ready for operation shall be furnished.
- C. The field person shall do a functional check of each item furnished and start-up of the process. During this time, the field representative will provide operation training, which shall include familiarization with the biological process controls, its requirement and review of the Operation and Maintenance Manuals.

3.05 DIFFUSER CLEANING SERVICES

- A. Provide one site visit for in-situ maintenance of diffused aeration equipment per year of operation for a period of X years. The site visit and service shall consist of:
 1. In-situ cleaning of one tank.
 2. Transportation of personnel and cleaning system equipment to and from job site
 3. Equipment for modification of tanks to allow for dosing of cleaning liquid into air distributors
 4. Post-visit field service report

3.06 PREVENTATIVE MAINTENANCE SERVICES

- A. Provide preventative maintenance services for the first year of operation after the warranty period is completed
- B. Onsite services
 - 1. Provide one site visit during the first year of operation after the warranty period is completed
 - 2. Site visits shall consist of one day onsite and be coordinated between the owner and supplier a minimum of ten working days prior to the time that the field services are desired.
 - 3. Site visits shall include the following services:
 - a) Visual check of bubble patterns in each basin/grid
 - b) Retrieve and assess on-site pressure monitoring readings [if pressure monitoring system supplied]
 - c) Inspect manual purge system in each basin/grid
 - d) Examine supplied pipework and associated joints – perform leak and level testing [customer must drain basin(s) for this step to be completed]
 - e) Perform laboratory or field testing of diffuser dynamic wet pressure
 - 4. Upon completion of the onsite inspection a complete written report shall be provided detailing assessments and recommendations

*** END OF SECTION ***

DIVISION 11 - EQUIPMENT

SECTION 11300

INTERNAL RECYCLE PUMPS

PART 1 - GENERAL

1.01 DESCRIPTION

A. The work to be included in this section shall include all labor, materials, equipment and services necessary for furnishing and installing internal recycle pumps as shown on the Contract Drawings or hereinafter specified.

B. Related Work Specified Elsewhere:

1. Section 09900: Painting – Equipment and Piping.
2. Section 11040: Equipment General Provisions.
3. Division 16: Electrical.

1.02 SUBMITTALS

A. Submit for approval Shop Drawings and Performance Affidavit, including dimensioned drawings, descriptive literature, operating curves showing head, pump efficiency, and horsepower vs. capacity; and electrical characteristics of the motors as specified under Section 01300 - SUBMITTALS.

B. Prior to pump delivery submit for approval certified copies of factory run pump performance tests for all centrifugal pumps. Manufacturer shall notify, in writing, the Owner or Engineer at least two weeks prior to factory testing so that the Owner or Engineer may, at their option, witness factory testing.

C. Submit operations and maintenance manuals as specified in Section 01300 - SUBMITTALS.

D. Submit manufacturer's certificates for all pumping units in accordance with Section 01300 - SUBMITTALS.

1.03 QUALITY ASSURANCE

A. Design and construct the pumps in accordance with standards of the Hydraulic Institute. The efficiency of the pumps, when operating under condition of the specified capacities and heads shall be as near peak efficiency as practicable.

B. Design and construct mechanical and electrical machinery and equipment in accordance with the latest:

- American Iron & Steel Institute (AISI)
- American Society for Testing and Materials (ASTM)
- Factory Mutual (FM)
- Hydraulic Institute Standards for Centrifugal, Rotary, and Recip Pumps (HI)
- National Fire Protection Agency (NFPA)
- National Electric Code(NEC)
- National Electrical Manufacturers Association(NEMA)
- Anti-Friction Bearing Manufacturers Association(AFBMA)
- International Standards Organization (ISO) - ISO9001
- Hydraulic Institute and NEMA Standards.

C. Obtain pumping equipment, motors, and appurtenances from the pumps supplier whose responsibility it is to ensure that the pumping equipment is properly coordinated and operated in accordance with these Specifications.

1.04 ACCEPTABLE MANUFACTURERS

A. Submersible Pump: subject to compliance with these specifications, the manufacturer shall be KSB, Inc. to maintain uniformity of equipment and interchangeability for Worcester County Water & Sewer Department with similar pumps in operation at the Mystic Harbour WWTP.

1. The contractor shall base his bid price on KSB, Inc. For the purpose of dertermining the succesful bidder.

1.05 WARRANTY

A. The pump manufacturer shall warrant the pump, motor and guide system against defects in workmanship and materials for a period of seven (7) years under normal use and service. The manufacturer shall warrant the guide cable system (including guide cables and brackets) against defects in workmanship and materials for a period of ten (10) years under normal use and service. Both pump manufacturer warranties shall be in published form and shall apply to all similar units. A copy of each warranty shall be provided to the Owner at startup.

PART 2 - PRODUCTS

2.01 PUMPING UNITS DESIGN DATA

A. Internal Recycle Pumps

1. Location — Aerobic Chambers

2.	Material Pumped	—	MLSS
3.	No. of Pumps	—	Two (2)
4.	Type of Pump	—	Submersible
5.	Pump Suction/Discharge	—	4 inches
6.	Operating Conditions Design	—	290 gpm @ 11 feet TDH
7.	Pump Motor (Max.)	—	7.5 HP
8.	Pump Speed (Max)	—	1750 rpm
9.	Motor	—	460 volts, 3 phase, 4-P

B. The pump, electric motor, and accessories shall be factory assembled at the pump manufacturer's facility. The pump manufacturer shall have complete unit responsibility.

2.02 PUMP UNITS MATERIALS

A. MATERIALS

1. Pump Case: Cast Iron, ASTM A48, Class 35B
2. Motor Housing: Cast Iron, ASTM A48, Class 35B
3. Impeller: Cast Iron, ASTM A48, Class 35B
4. Intermediate Housing (Backplate): Cast Iron, ASTM A48, Class 35B
5. Discharge Base Elbow: Cast Iron, ASTM A48, Class 35B
6. Pump/Motor Shaft: ASTM A276 Type 420 stainless-steel
7. O-Rings: Nitrile Rubber (NBR)
8. Fasteners (including impeller fastener): Stainless Steel, ASTM A276 Type 316Ti.
9. Lower Seal Faces: Silicon Carbide/Silicon Carbide
10. Upper Seal Faces: Silicon Carbide stationary/Carbon rotating
11. Guide rails and mounting brackets: Stainless Steel, ASTM A276 Type 316 (cables shall be nylon coated)
12. Lifting Chain or cable: Stainless Steel, ASTM A276 Type 316
13. Oil-all uses (seal lubrication, etc.): Ecologically safe, paraffin or mineral base
14. Power/Control Cable Jacket: Chloroprene with non-wicking fillers

2.03 ACCESSORIES

A. Power cable: Provide 50 feet of power/control cable with each pump, suitable for submersible wastewater application, sized in accordance with NEC requirements. Provide cable terminal box on side of motor housing, with cable entry sealed to insure that no entry of moisture is possible into the high-voltage motor/ terminal area even if the cable is damaged or severed below water level. Cable seal shall include a compressed rubber grommet to seal the cable exterior and epoxy fill to seal the interior passages. A strain relief device, in direct contact with both the cable and the cast iron entry housing, shall be provided. The cable entry shall be rated by Factory Mutual (or UL) for submerged operating depths to 85 feet.

B. Temperature protection: Furnish temperature monitoring devices in motor windings for use in conjunction with and supplemental to external motor overload protection. Arrange controls to shut down pump should any of the monitors detect high temperature and automatically reset once motor temperature returns to normal. Set temperature monitors at levels recommended by pump manufacturer.

C. Seal Leak Protection: Provide a detector in the motor's stator cavity which allows a control panel mounted relay to indicate leakage into the motor. In addition, on motors 80HP and larger provide a stainless steel float switch in a separate leakage collection chamber to indicate leakage past the inner mechanical seal prior to its entrance into either the motor stator cavity or the lower bearing. Electronic probes which depend on sensing resistance value changes in seal oil will not be acceptable as seal leak indicators.

D. "PumpSafe" MOTOR SENSOR MONITORING RELAY

1. The pump supplier shall furnish all relays required for monitoring all motor sensors. The relays shall be installed by others in the motor control panel and properly wired in accordance with pump manufacturer's instructions. Relays shall mount in standard 12-pin socket bases (provided) and shall operate on available control voltage of 24-240 VAC. If relays require an input voltage that is not available in the motor control panel an adequate transformer (with fused input) shall be provided by the pump supplier. Relays shall have a power consumption of no more than 2.8 watt, and shall be UL approved. Relays shall be modular in design, with each relay monitoring no more than two motor sensor functions.
2. Each relay module shall include a dual color (red/green) LED to indicate the status of each monitored sensor. Green will indicate "status OK"; red will indicate a failure or alarm condition. A self-corrected fault will allow the relay output contacts to reset, and cause the LED to change from a steady alarm indication to a flashing signal. The LED shall continue to flash until locally cleared, providing the operator an indication of a potential intermittent fault. Each relay shall also include a power-on LED and both "test" and "reset" pushbuttons.
3. An independent fail-safe (switch on power loss) form-C output contact shall be included for each monitored sensor to provide a normally-open / normally-closed dry contact to initiate a remote alarm device or shut down the motor. Contacts shall be rated for 5 amps at 120 volt.

2.04 FABRICATION

A. General: Provide pumps capable of handling raw unscreened wastewater. Design pumps to allow for removal and reinstallation without the need to enter the wet well and without removal of bolts, nuts or other fasteners. Provide a pump which connects to a permanently mounted discharge connection by simple downward motion, without rotation, guided by at least two non-load-bearing guides. All system components for guide cable systems, including cable, shall be supplied and warranted by the pump manufacturer. For guide pipe systems the pipe shall be supplied and warranted by the installing contractor. Guide cable systems shall be suitable for proper operation when installed at up to 5-degree misalignment from vertical, pipe guides must be installed perfectly plumb and vertical. Intermediate guide supports (between upper bracket and discharge elbow connections) shall not be required for cable systems but MUST be supplied where needed to maintain perfect alignment for pipe guides. Final connection shall ensure zero leakage between pump and discharge connection flange. Provide a discharge connection/ guide system so that no part of the pump bears directly on the floor of the wet well. Provide Type 316 stainless steel chain of sufficient length to properly and safely lift pumps from the wet well. All exposed cast iron and ferrous surfaces shall be cleaned of dirt and grease, sandblasted to near white finish, and coated with an anti-corrosion reaction primer. The pump shall then be coated with two-component thick coat paint, with an epoxy resin base, having at minimum 83% solids by volume. This coating shall be non-toxic and approved for both wastewater and water applications.

B. Major Components: Furnish major components (pump case, impeller, intermediate housing, motor housing) of cast material as specified with smooth surfaces devoid of blow holes and other irregularities. Pump case design shall incorporate a centerline discharge for stability when mounted on the base elbow.

C. Impeller: The impeller(s) shall be of gray cast iron, Class 35B, dynamically balanced, semi-open, non-clogging design capable of handling soils, fibrous materials, heavy sludge and other matter found in wastewater. The impeller(s) shall have a back shroud only with back pump-out vanes to equalize axial thrust, and curved blades which protrude into the pump casing for maximum efficiency. The impeller will create a vortex which carries solids through the pump casing without passing through the blades. Impeller(s) shall be capable of passing a minimum 3" diameter solids.

D. Shaft: Provide common pump/motor shaft of sufficient size to transmit full driver output with a maximum deflection of 0.002 inches measured at the lower mechanical seal. Machine the entire pump/motor shaft of ASTM A276 Type 420 stainless-steel.

E. Shaft Seal: Provide two totally independent mechanical shaft seals, installed in tandem, each with its own independent single spring system acting in a common direction. Install the upper seal in an oil-filled chamber with drain and inspection plug (with positive anti-leak seal) for easy access from external to the pump. Provide seals requiring neither routine maintenance nor adjustment, but capable of being easily

inspected and replaced. Provide seals which are non-proprietary in design, with replacements available from a source other than the pump manufacturer or its distributors. Do not provide seals with the following characteristics: conventional double mechanical seals with single or multiple springs acting in opposed direction; cartridge-type mechanical seals; seals incorporating coolant circulating impellers, seals with face materials other than those specified.

F. Bearings: Furnish upper and lower antifriction bearings. The bearing system shall be adequately designed so as to be capable of handling all axial thrust loads plus any and all radial loads. The bearings shall be sealed/shielded (permanently lubricated for life).

G. Motor:

1. Provide a motor which is squirrel cage, induction in design, housed in a completely watertight and air-filled chamber, with a min 1.15 service factor. The motor shall be adequately sized and rated for continuous operation at a maximum fluid temperature of 104° F (40° C). Allowable maximum submergence shall not be less than 100ft (30 m). The motor stator shall be wound using Class H monomer-free polyester resin insulation resulting in an overall motor rating of 311 Degrees F (155 degrees C), Class F insulation. The stator windings shall be current-UV-dip impregnated resulting in a winding fill factor of at least 95%. The use of a multiple step "dip and bake" type stator insulation method shall not be acceptable. The rotor bars and short circuit rings shall be made of aluminum. The motor and pump set complete shall be designed and manufactured by the same company. Provide temperature protection and seal leak detection as described in section above. Provide adequately rated motor with sufficient surface area for ambient only cooling suited for the intermittent mode of operation in wet well wastewater applications, submerged or partially submerged, without damage. Motors containing dielectric oils used for motor cooling and/or bearing lubrication or motors where the pumped media or externally provided fresh water is directed through the motor shell for cooling are not acceptable.

PART 3 - EXECUTION

3.01 INSTALLATION AND FIELD QUALITY CONTROL

A. The Contractor shall install all equipment in strict accordance with the manufacturer's recommendations and the requirements of Section 11040 - EQUIPMENT GENERAL PROVISIONS. The Equipment Supplier shall make all necessary adjustments to equipment in order to provide complete and satisfactory operation upon completion of the contract.

B. Brace all piping at suction and discharge connections to withstand all shock loads and vibration.

3.02 TESTING

A. Field Testing and Inspection:

1. The Contractor, in conjunction with the manufacturer's authorized service representative, shall perform tests specified herein to assure compliance with all performance requirements.
2. Contractor shall furnish copies of the test results to the Engineer on the day of the testing.
3. All pumps shall be field tested to verify pump capacities and Total Dynamic Head (TDH).
4. Engineer shall be notified in writing at least one (1) week in advance of field testing.

3.03 EQUIPMENT MANUFACTURER'S SERVICE REPRESENTATIVE

A. Equipment manufacturer's service representative shall provide for a period of not less than one (1) 8-hour day to check the complete installation, complete final performance run, place system into operation, and provide training to Owner.

B. A written report covering the technician's findings and installation approval shall be submitted to the Engineer covering all inspections and outlining in detail any deficiencies noted.

*** END OF SECTION ***

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DIVISION 11 - EQUIPMENT

SECTION 11308

WASTE BACKWASH PUMP STATION

PART 1 - GENERAL

1.01 DESCRIPTION

A. Provide materials, labor, equipment, and service to construct complete and operational submersible type duplex pump station. Work includes but is not limited to excavation; construction of concrete wet well; valve vault; installation of the complete pumping system including pump controls; piping to and from the station; electrical hook-up and controls; backfilling and site work.

B. Adhere to layout and details of the station as shown on the drawings and specified herein.

C. Related work specified elsewhere:

1. Section 09900: Painting
2. Section 11040: Equipment General Provisions
3. Division 15: Mechanical
4. Division 16: Electrical

1.02 SUBMITTALS

A. Submit shop drawings of the complete pump station. It shall include, but shall not be limited to:

1. Precast concrete, poured-in-place concrete and steel reinforcement.
2. Watertight hatches and covers.
3. Pumps; pump motors.
4. Interior, exterior piping and joints.
5. Check valves, plug valves
6. Guide rails.
7. Electrical items.
8. Non-shrink, non-metallic grout.
9. Concrete mix design.
10. Interior and exterior coatings.
11. Stone; select backfill; borrow.
12. Submersible level sensing transducer system, and pump controls.

B. Furnish Operation and Maintenance Manuals in accordance with SECTION 01300 – SUBMITTALS.

C. Include certifications in the Operation and Maintenance Manuals as follows:

1. Certifications that precast concrete, pipe and fittings are as specified herein.
2. Written certification stating that a factory trained field service engineer has inspected and adjusted the finished installation and that the pump station is ready for operation. NOTE: Start up training and instruction to the Owner's operating personnel shall not be given until pump station is certified ready for operation.
3. Written certification of guarantee as specified herein.

1.03 GUARANTEE

A. The manufacturer through the Contractor shall guarantee for two (2) years from date of final acceptance by the Owner, the station and the equipment contained therein against:

1. Defective design.
2. Defective material.
3. Faulty workmanship.

B. If the materials and equipment supplied have a standard guarantee of more than two (2) years, the manufacturer, through the Contractor, shall provide the longer guarantee.

C. The pump station manufacturers shall furnish parts for any component proven defective whether of his or other manufacturers' origins during the guarantee period excepting only those items which are normally consumed in service such as light bulbs, grease, mechanical seals, etc.

1.04 QUALITY ASSURANCE

A. Design and construct the pumps in accordance with standards of the Hydraulic Institute. The efficiency of the pumps, when operating under condition of the specified capacities and heads, shall be as near peak efficiency as practicable.

B. Design and construct mechanical and electrical machinery and equipment in accordance with the latest ANSI, Hydraulic Institute and NEMA Standards.

C. Obtain pumping equipment, motors and appurtenances from the pumps supplier whose responsibility it is to ensure that the pumping equipment is properly coordinated and operated in accordance with these Specifications

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

A. General: In addition to requirements for materials handling and storage as stated in the General Conditions of the Contract, the following applies:

1. When unloading materials, equipment and machinery provide special lifting harness or apparatus as may be required by manufacturers. Handle materials, equipment, and machinery in accordance with manufacturer's written instructions.
2. Store materials, equipment and machinery, both on and off site, in accordance with the manufacturer's written instructions.

1.06 ACCEPTABLE MANUFACTURERS

A. Submersible, Non-Clog Pumps

1. ITT Flygt, Model NP3127 MT3, Adaptive 439, or equal

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. Material and equipment installed as a part of the permanent installation shall be new and in accordance with the prescribed specifications.

B. Where material or equipment is identified by proprietary name, model number, and/or manufacturer, furnish the named item or equivalent thereof, subject to written acceptance of the Engineer.

C. Substituted items shall be equal, or better, in quality to the specified equipment, and must be approved by the Engineer based on a full submission of technical information.

2.02 SUBMERSIBLE NON-CLOG PUMPS

A. The Contractor shall furnish and install submersible non-clog pumps; capable of handling waste backwash for a water treatment plant treating for iron, as manufactured by Flygt Corporation of Norwalk, Connecticut.

B. Pumping unit design data:

- | | | | |
|----|----------------------|---|-------------------|
| 1. | Location | — | WTP Site |
| 2. | Material Pumped | — | Waste Backwash |
| 3. | No. of Pumps | — | Two (2) installed |
| 4. | Type of Pump | — | Submersible |
| 5. | Outlet (Min.) | — | 4 inches |
| 6. | Discharge Elbow Size | — | 6 inches |

7.	Duty Point	—	630 gpm @ 32 feet TDH
8.	Pump Motor (Min.)	—	7.5 HP
9.	Phase, voltage	—	460 volts, three (3) phase
10.	Pump Speed (Max)	—	1755 rpm
11.	Pump Impeller	—	187 mm (Hard Iron)

C. Pump discharge connection elbow shall be permanently installed in the wet well along with the discharge piping. The pumps shall be automatically connected to the discharge connection elbow when lowered into place and shall be easily removed for inspection or service. There shall be no need for personnel to enter pump well. A sliding guide bracket shall be an integral part of the pump unit. The entire weight of the pumping unit shall be guided by no less than two parallel guide bars of stainless steel. Sealing of the pump unit to the discharge connection elbow shall be accomplished by a simple linear downward motion of the pump and shall seal with a machined metal-to-metal contact. Sealing of the discharge interface by means of a diaphragm, O-ring, or other devices shall not be acceptable. No portion of the pump shall bear directly on the floor of the sump. The pump, with its appurtenances, shall be capable of continuous submergence underwater without loss of watertight integrity to a depth of 65 feet.

2.03 PUMP CONSTRUCTION

A. Major pump components shall be of grey cast iron, ASTM A-48, Class 35B, with smooth surfaces devoid of blow holes or other irregularities. The lifting handle shall be of stainless steel. All exposed nuts or bolts shall be of stainless-steel construction. All metal surfaces coming into contact with the pumpage, other than stainless steel or brass, shall be protected by a factory applied spray coating of acrylic dispersion zinc phosphate primer with a polyester resin paint finish on the exterior of the pump.

B. Major pump components shall be of gray cast iron, ASTM A-48 Class 35B, with smooth surfaces devoid of blow holes and other irregularities. All exposed nuts and bolts shall be of AISI 304 stainless steel. All surfaces coming into contact with sewage, other than stainless steel, shall be protected by a factory applied spray coating of alkyd primer with an acrylic dispersion zinc phosphate primer with a polyester resin paint finish.

C. Sealing design shall incorporate metal-to-metal contact between machined surfaces. All mating surfaces where watertight sealing is required shall be machined and fitted with nitride or Viton rubber O-rings. Fittings will be the result of controlled compression of rubber O-rings in two planes and O-ring contact of four sides without the requirement of a specific torque limit. No secondary sealing compounds, rectangular gaskets, elliptical O-rings, grease or other devices shall be used.

D. The cable entry seal design shall preclude specific torque requirements to insure a watertight and submersible seal. The cable entry shall consist of a single cylindrical elastomer grommet, flanked by washers, all having a close tolerance fit against the cable outside diameter and the entry inside diameter and compressed by the body

containing a strain relief function, separate from the function of sealing the cable. The assembly shall provide ease of changing the cable when necessary, using the same entry seal. The cable entry junction chamber and motor shall be separated by a stator lead sealing gland or terminal board, which shall isolate the interior from foreign material gaining access through the pump top. Epoxies, silicones, or other secondary sealing systems shall not be considered acceptable.

E. The pump shaft shall be of stainless-steel type 431 (ASTM A479 S43100-T). Pump and motor shaft shall be the same unit. The pump shaft shall be an extension of the motor shaft.

F. Each pump shall be provided with a tandem mechanical shaft seal system consisting of two totally independent seal assemblies. Seals shall run in a lubricant reservoir. Lapped seal faces must be hydrodynamically lubricated at a constant rate. The upper and lower seal units, between the pump and oil chamber, shall contain one stationary and one positively driven rotating tungsten-carbide ring. Both upper and lower seals are of tungsten-carbide as standard (superior to ceramic). Each interface shall be held in contact by its own spring system. The seals shall require neither maintenance nor adjustment, nor depend on direction of rotation for sealing, but shall be easily inspected and replaceable. The following seal types shall not be considered acceptable nor equal to the dual independent seal specified: Shaft seals without positively driven rotating member, or conventional double mechanical seals containing either a common single or double spring acting between the upper and lower units. This conventional system requires a pressure differential to offset external pressure and to effect sealing.

G. Each pump shall be provided with an oil chamber for the shaft sealing system. The oil chambers shall be designed to assure that air is left in the oil chamber to absorb the expansion of the oil due to temperature variations. The drain and inspection plug, with positive anti-leak seal shall be easily accessible from the outside. The motor shall be able to operate dry without damage while pumping under load. Seal oil shall be FDA approved, non-toxic.

H. The pumps shaft shall rotate on two (2) permanently lubricated bearings. The upper bearing shall be a single deep groove ball bearing and the lower bearing a two row angular contact ball bearing.

I. The impeller shall be of hard-iron (ASTM A-532 (Alloy III A) 25% chrome cast iron as standard (superior material). The impeller shall be capable of handling solids, fibrous materials, heavy sludge, and other matter found in normal sewage applications. The impeller shall be a full vaned design. The pump manufacturer shall, upon request, furnish mass moment of inertia data for the proposed impeller. The impeller shall be capable of passing a minimum 3" solid sphere. The impeller shall be keyed to the shaft and retained with an Allen head bolt.

J. The volute shall be a single piece design and shall have smooth fluid passages large enough at all points to pass any size solids which can pass through the impeller. Volute shall be gray iron, Class 35B.

K. Guide rails of 304 stainless steel pipe shall be provided for removing pumps and shall be sized and stiffened in accordance with manufacturer's recommendations.

L. A 304 stainless steel lifting chain shall be provided for each pump. The chain shall be of adequate strength to permit raising and lowering the pump and of adequate length to remove the pump from the wet well.

M. The volute shall have a replaceable suction cover insert ring in which are cast spiral-shaped, sharp-edged groove(s). The spiral groove(s) shall provide trash release pathways and sharp edge(s) across which each impeller vane leading edge shall cross during rotation so to remain unobstructed. The insert ring shall be cast of Hard-Iron™ (ASTM A-532 (Alloy III A) 25% chrome cast iron) and provide effective sealing between the multi-vane semi-open impeller and the volute housing.

N. The pump shall be equipped with a seal leak detection float and warning system. If the lower seal fails, contaminants which enter the seal chamber shall be detected by the float and the sensor shall stop the motor and send an alarm signal to the local and/or remote indicator.

2.04 PUMP MOTOR

A. Pump motor shall be of the sealed submersible type. Rail guides shall be fastened to pump so that all lifting loads will come on the guide supports and not on the pump or motor housing. Both pump motor shaft and rail guides shall be stainless steel.

B. Construction:

1. Pump motor shall be designed to meet the required station horsepower and hertz.
2. Pump motor shall be squirrel-cage, induction shell type design, housed in air-filled, watertight chamber. The stator winding and stator leads shall be insulated with moisture resistant Class H insulation which will resist a temperature of 155 degrees C (311°F). The stator shall be dipped and baked three times in Class F varnish.
3. Pump motor shall be equipped with heat sensors. The heat sensor(s) (one on single phases, two on three phase) shall be a low resistance, bi-metal disc that is temperature sensitive. It (they) shall be mounted directly in the stator and sized to open at 120 to 130 degrees C and automatically reset at 30 to 35 degrees C differential. The sensor shall be connected in series with the motor starter coil so that the starter is tripped as a heat sensor opens. The motor starter shall be equipped with overload heaters, so all normal overloads are protected by external heater block.

4. Each unit shall be provided with an adequately designed cooling system. Thermal radiators (cooling fins) integral to the stator housing shall be adequate to provide the cooling required by the motor. A water jacket or another device shall not be necessary for continuous pumping at sump liquid levels below midpoint of stator housing.
5. The pump motor cable, installed with no splices between pump and starter-contactor, shall be suitable for submersible pump application with P122-Caps Approval and shall be indicated by a code or legend permanently embossed on the cable. Cable sizing shall conform to NEC specifications for pump motors. Sufficient cable length shall be provided for the pump to be lifted out of the wet well a minimum distance of ten feet. There shall be a separate conduit leaving the wet well for each pump cable. The Contractor is to provide a separate cable strain relief for each cable.

2.05 PUMP CONTROL SYSTEM

- A. The station control panel shall provide for all aspects of operation and control for the duplex pumping units and shall be as specified in DIVISION 16.

2.06 STATION PIPING AND VALVES AND APPURTENANCES

- A. All ductile iron pipe shall be Class 50, manufactured in accordance with the standards of ANSI A 21.51 (AWWA C151) and shall not be more than 20 feet in length. All ductile iron pipe and fittings shall be furnished with mechanical joint end design conforming to ANSI A21.11. All joints shall be furnished with ductile iron retainer glands. All pipe and fittings which will be exposed in the wet well shall be furnished with flanged joint end design conforming to ANSI A 21.51 and ANSI B 16.1 faced and drilled 125-pound standard. Refer to SECTION 11200- PIPING, VALES AND APPUTENANCES for additional requirements.

- B. Drainpipe shall be ductile iron.
- C. Vent lines shall be Schedule 80 PVC. Vent lines shall be gray.
- D. Check Valve shall be as specified in Specification Section 11200.
- E. Plug Valves shall be as specified Specification Section 11200.
- F. Pipe couplings and retainer glands shall be as specified in Section 11200.

2.07 PRECAST CONCRETE WET WELL STRUCTURE AND VAULTS FOR PUMP STATION

- A. Precast reinforced concrete sections with extended monolithic base sections of the size and location indicated on the drawings and in conformance with ASTM

Designation C478. Concrete shall be 4,000 psi and constructed according to Concrete Construction Methods and Materials section and DIVISION 3 - CONCRETE of these specifications.

B. Joints shall be O-ring or D-Lok gasketed joints meeting the requirements of ASTM C-443. The pipe to wet well or vault connections will require cast in place resilient gasket seals.

C. Refer to Specification 09900- Painting for wet well and valve vault painting requirements.

2.08 POURED-IN-PLACE CONCRETE

A. Top slab equipment slabs shall be poured-in-place reinforced concrete. Concrete shall have a minimum compressive strength of 4000 psi at 28 days. Submit mix design. Concrete to be mixed, placed and cured in accordance with applicable sections of ACI 318.

B. Reinforcing bars shall be deformed new billet steel, ASTM A615, Grades 60.

C. Concrete to be Class "A", air entrained containing 6% \pm 2% air in accordance with AASHTO Designations T152 or T196.

D. No retarding admixtures permitted unless prior approval in writing from the Engineer.

2.09 ACCESS FRAMES AND COVERS

A. Refer to Section 05500 - Metals.

2.10 PROTECTIVE COATINGS

A. See Specification Section 09900 - Painting.

PART 3 - EXECUTION

3.01 PREPARATION

A. Wet Well Structure:

1. The wet well shall be installed at the elevations and depths as specified on the drawings. Construction methods shall be in accordance with Sections elsewhere herein.
2. The wet well floor shall have a minimum slope of one to one or as shown on drawings to form the hopper bottom. The horizontal area of the installation and function of the pump inlet.

3. Refer to SECTION 09900- PAINTING for details on interior and exterior paint schedule for wet well and valve vaults.

B. Reinforced Concrete:

1. General:
 - a. The Contractor shall furnish all labor, equipment and materials required to complete all concrete work for the pumping station and wet well including foundation, base slab, and equipment slabs as shown on the drawings and as specified.
2. Insertion of Other Work:
 - a. Before placing any concrete, the Contractor shall install all sleeves, anchors, fittings, pipes, rings, conduits, etc., called for or required by the provisions of other sections of these specifications and/or noted on the drawings. No pouring of concrete shall begin until the Engineer has approved forms, reinforcing and given approval to proceed.
3. Concrete Finish:
 - a. All exposed angles of concrete surfaces made of intersecting vertical or horizontal planes shall be chamfered 3/4" by 3/4".
 - b. All exposed concrete slabs will receive a straight, light broom finish.
4. Concrete Grout:
 - a. Non-shrinking non-corrosive mortar grout for fill around sleeves and where indicated on the drawings, mixed and placed in accordance with manufacturer's application instructions.
5. Concrete Testing:
 - a. Provide for concrete tests to be made by an approved testing agency employed by and paid for by the Contractor. The minimum amount of testing will be the first concrete for footings, slabs on grade, framed slabs, etc. At least one test is required for each 50 cubic yards or portion thereof placed in any one day. If inadvertent tests are not made, the Engineer may require coring or additional testing, the costs of which will be borne by the Contractor. Make four (4) tests cylinders for each test, two cylinders for 7-day tests and two for 28-day tests. Submit test reports to the Engineer immediately upon completion of each test.
 - b. Test Cylinders: Mold and cure in accord with ASTM C 31, and test in accord with ASTM C 39.
 - c. Concrete cylinders to be molded, transported, stored and tested by the Testing Agency. Contractor to provide suitable storage facilities for the molds at job site. It is the Contractor's responsibility to notify the Testing Agency before each placement so that the Agency may properly schedule the taking of test cylinders. Testing Agency to furnish molds.
 - d. Should strength of any test cylinder fall below the required strength, the Engineer shall have the right to require a change in proportions

to insure adequate strengths in the remainder of the project and shall have the right to test the concrete by coring, loading or other means, or removal of that portion of the construction covered by this test, costs of which are to be borne by the Contractor.

- e. Test for Slump: Determine consistency in the field by means of slump test in accord with ASTM C 143. Make slump tests at frequent intervals as directed. Indicate results of slump tests on Cylinder Test Reports.

6. Delivery Tickets:

- a. The Contractor shall furnish Delivery Tickets to the Engineer for each load of concrete delivered to the site.

3.02 INSPECTION AND TEST

A. Prior to assembly, all station components shall be inspected for quality and tested for proper function and freedom from defects. Upon completion, the station shall be connected to a test tank and an operational test performed under simulated field conditions while a final inspection is conducted. Any deficiencies or irregularities shall be corrected at the factory. Automatic controls shall be adjusted to approximate job requirements.

3.03 INITIAL OPERATION

A. After the job installation is complete, an initial quality control inspection shall be performed by the Owners Representative. The station shall be approved for initial operation by the Owner before operation. A qualified factory representative shall place the station in operation, conduct a complete junction check, and make all necessary adjustments for regular service.

3.04 GUARANTEE

A. The Contractor of the lift station shall guarantee, for two (2) years from the date of pump station acceptance, that the entire station and all equipment therein shall be free from defects in design, materials, and workmanship. In the event a component fails or is proven defective during the guarantee period, the Contractor will provide a replacement part without cost upon return of the defective part. Normal use items such as grease, light bulbs, mechanical seals, packing, and belts are excluded.

3.05 FINAL APPROVAL

A. Final quality control inspection shall be performed by the Engineer and Owner. All items noted on inspection form shall be repaired, constructed, or supplied by the Contractor. The lift station will not be turned over to the Owner for operation and maintenance until all items are completed per specification and to the Owner's

satisfaction. Contractor shall furnish to the Owner a copy of As-Built Drawings. This shall include lift station pump, control panel, utility depth and alignment, etc.

3.06 PUMP STATION START-UP AND SERVICE REPRESENTATIVE

A. The pumps shall be performance tested at the manufacturer's plant prior to shipment. The performance shall be within the limits set forth by the Hydraulic Institute. At a minimum, each finished pump shall be performance tested for total dynamic head, capacity, efficiency and power requirements at five (5) operating points plus shut-off head for the selected impeller diameter, of which, the design capacity operating point shall be certified by a Professional Engineer who may be an employee of the pump manufacturer.

B. Manufacturer shall furnish factory certified pump performance test results to the Engineer for approval prior to installation at the site.

C. The Contractor at no additional expense to Owner will provide a qualified manufacturer's field engineer for a period of:

1. Furnish an operating technician, competent and experienced in operating the equipment, to start up the station in accordance with the following (at a minimum):
 - a. One (1) trip and one (1) day for manufacturer's certification,
 - b. One (1) trip and one (1) day for start-up of pumps and controls.
 - c. One (1) trip and one (1) day for training of operating personnel.
2. Keep his technician on the job until everything is functioning correctly. Submit written certification of same to the Owner.
3. Have his technician return to the job to make replacements of equipment or parts, where deemed necessary.
4. These trips are in addition to any other trips or time requested by the Contractor or required by the Equipment Manufacturer during the installation and field testing of equipment.

*** END OF SECTION ***

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DIVISION 11 - EQUIPMENT

SECTION 11315

SUBMERSIBLE MIXERS

PART 1 – GENERAL

1.01 DESCRIPTION OF WORK

A. Install four (4) submersible mixers for Anoxic Chamber 1A, 1B, 2A, and 2B. complete with all motors and drives, mixer guiderails and appurtenances, in compliance with these specifications and as shown on the Drawings.

B. Unless otherwise noted, all controls for motorized mechanical equipment specified in this section shall be furnished in accordance with Division 16.

1.02 RELATED SECTIONS

A. The specification sections listed below are an integral part of this equipment specification; provide these sections to the equipment suppliers:

1. Section 11040: Equipment General Provisions
2. Division 16: Electrical

B. All electrical equipment, controls and wiring shall be in full compliance with Division 16, Electrical Specifications.

1.03 PERFORMANCE REQUIREMENTS

A. Mixers shall meet the following criteria:

	<u>Mixers</u>
1. No. of mixers (per zone):	1
2. Maximum motor horsepower (hp):	3.4
3. Maximum propeller speed (rpm):	1695
4. Minimum propeller diameter (in):	8.86

B. Mixers shall prevent accumulation of solids on the tank bottom of the zones.

C. Mixers shall not induce vortexing in surface water above the mixer nor shall they cause air bubbles to become entrained in the wastewater.

D. Mixer shall operate without producing excessive noise or vibration.

- E. Mixers shall not require a lifting mechanism be stationed above mixer at all times.

1.04 SUBMITTALS

- A. Submittals shall be in accordance with Sections 01300 and as specified herein.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

- A. The mixer manufacturer shall be the following or equal: KSB, Richmond, VA, Model Amamix 2227/24 UDC.

- B. The manufacturer and mixers are the same make and model used in other Worcester County WWTP's for the purpose of uniformity in maintenance and spare parts.

2.02 EQUIPMENT DESIGN

- A. General
 - 1. The mixers shall be equipped with a direct-coupled submersible electric motor with moisture and temperature sensor.

- B. Cable Junction Chamber
 - 1. Rubber house cable design sealed along the entire length with a length of 33 feet with a junction chamber.

- C. Seals
 - 1. Two (2) mechanical seals in tandem arrangement with oil reservoir.

- D. Propeller
 - 1. Stainless steel A 276 Type 316Ti.

2.03 ACCESSORIES

- A. Power Cable
 - 1. Power cable, moisture detection sensor cable and motor thermal overload sensor cable shall be attached together and protected by common protective sheath.
 - 2. The cable shall be fitted with a ¾ inch heavy duty flexible protective hose that shall be secured to the upper guide holder assembly and pulled tight.

The protective hose shall safeguard the power cable from abrasion and/or piercing objects in the fluid.

3. Contractor shall coordinate the required length of cable for installation and provide a minimum of 10 feet of length to be coiled and secured to the handrail to facilitate maintenance.

B. Mixer Mount Assembly

1. A stainless-steel mixer mount assembly shall be used to mount the mixer during operation and to guide the unit during installation and removal from service.
2. The assembly shall consist of a bottom pivot assembly, 2-inch by 2-inch mixer mast assembly, fixing bracket, and guide holder assembly made of Type 304 stainless steel.
3. The bottom assembly shall be bolted to the floor of the tank and provide support for the guide mast.
 - a. It shall include a hole to accept the guide mast bottom pivot.
 - b. The guide mast must be strong enough to support the mixer thrust force.
4. The upper guide holder assembly shall secure the system to the walkway, wall or platform (as applicable) and shall include:
 - a. The upper guide holder shall provide the lateral support of the guide rail while allowing the guide mast to be positioned at any angle over a 180-degree arc and "locked" in place.
 - b. The lateral angle of the mixer guide rail shall be capable of being repositioned without the need for personnel to enter the tank.
5. The upper bracket or mixer mast shall be fitted with a special receptacle designed to securely hold and support the portable lifting davit while the mixer is raised, lowered, installed or removed from the tank.
6. The assembly shall also include a stainless-steel support cable assembly and a square 304 stainless steel mast.
 - a. The mast shall also be provided with cable ties for use with the mixer electric power cable (one every 5 feet) to prevent the electric cable from being entangled in the mixer propeller during operation.
 - b. In addition, the mast shall be constructed with a positioning locking plate which will work in conjunction with a lock pin on the upper guide holder to positively lock the mast in place at various operating angles.
 - c. The mast shall allow the mixer, when raised from the tank with a davit crane, to be removed from the mixer mast.

2.04 CONTROLS

- A. Unless otherwise noted, controls for equipment specified in this section shall be furnished by the control systems integrator and shall be in full compliance with Division 16.

2.05 FABRICATION REQUIREMENTS

- A. Surface preparation, shop painting and field painting and other pertinent detailed painting specifications shall be in accordance with Section 09900.
- B. All bolts, nuts, washers and other fasteners shall be Type 316 stainless steel unless otherwise noted.
- C. Backpaint metals in contact with concrete or masonry with 5 mils of Tnemec Series 66-Gray, Hi-Build Epoxoline or DuPont 25P Epoxy.
- D. Isolate dissimilar metals with dielectric using appropriate fasteners.
- E. Welds shall be continuous unless noted otherwise.
- F. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush and hairline. Ease exposed edges to small uniform radius.

PART 3 – EXECUTION

3.01 EQUIPMENT INSTALLATION

- A. Furnish and install the equipment according to the Contract Documents and the manufacturer's instructions.
- B. Contractor shall field verify all dimensions and elevations and shall notify Engineer of any specific differences.
- C. Furnish all necessary materials (including lubricants, etc.) and equipment (including measuring devices, etc.) for initial operation and testing.
- D. Anchor bolts shall be Type 304 SS HILTI-style epoxy anchors.

3.02 FIELD TESTING AND INITIAL OPERATION

- A. Start-up and initial operation shall be performed in accordance with Section 01700 and this specification section.
- B. All testing shall be done in the presence of the Engineer and the equipment manufacturer or their approved representative.
- C. Final acceptance of the mixers will be made after all equipment has been demonstrated in the field to meet the performance requirements state din this

specification under all normal operating conditions. The final acceptance test for the mixers shall consist of two phases.

1. The test shall consist of the following:
 - a. Mixers shall be raised and lowered with davit crane to demonstrate free movement of mixer on guide rail and proper self-connection of mixer to discharge flange.
 - b. The propeller shall be checked for correct rotation.
 - c. The shaft rotational speed shall be checked to match the manufacturer's recommendations.
 - d. The shaft, impeller, motor and drive shall be checked for abnormal noise or excessive vibration.
2. The test shall consist of the following:
 - a. Verifying that the motors are not overloading under normal operating conditions.
 - b. Verifying that surface vortexing is not occurring
 - c. Measuring amperage and voltage in each phase. After mixers have been operating submerged for four hours, the motors shall be megger tested and the results recorded.

D. Adjust, repair, modify or replace any components of the system which fail to meet all specified requirements.

3.03 SERVICES OF MANUFACTURER'S REPRESENTATIVES

A. Unless stated otherwise in the individual equipment section, the Contractor shall arrange for the equipment manufacturer to furnish the services of a qualified representative in accordance with specification Section 11040.

*** END OF SECTION ***

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DIVISION 11 – EQUIPMENT

SECTION 11380

BLOWER FOR DIP TANK

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. The contractor shall provide all labor, materials, equipment, and services necessary for installing complete, ready for operation and field test of blower and appurtenances as shown on drawing and as specified herein.

B. These specifications are intended to give a general description of what is required, but do not cover all details that will vary in accordance with the requirements of the equipment application. It is, however, intended to cover the furnishing, delivery, complete installation and field testing of all materials, equipment and all appurtenances required to complete the Work in this section, whether specifically mentioned in these specifications or not.

C. The blower package and its components shall comply with all applicable safety and environmental regulations.

1.02 RELATED WORK

A. The specification sections listed below are an integral part of this equipment specification; provide these sections to the equipment suppliers:

1. Section 11040: Equipment General Provisions
2. Division 16: Electrical

B. All electrical equipment, controls and wiring shall be in full compliance with Division 16, Electrical Specifications.

1.03 SUBMITTALS

A. Submit shop drawings and product data for all equipment per Section 01300 – SUBMITTALS.

B. Submit Operations & Maintenance manuals for all equipment per Section 01300 – SUBMITTALS.

C. Submit manufacturer's certificates for all equipment per Section 01300 – SUBMITTALS.

1.04 QUALITY ASSURANCE

- A. Manufacturer or Packager Qualifications: Supplier shall have experience in providing similar equipment and shall show evidence of satisfactorily operating installations in the eastern region of the United States.
- B. Blower Packagers must be an Authorized Distributor or Representative of the blower being supplied and must be authorized to perform warranty service. Blower and appurtenances furnished under this section shall be furnished by a single manufacturer and manufacturer shall provide a written warranty for the blower and blower package.
- C. Manufacturer's certificates including performance affidavit for all equipment furnished under this Section and per Section 01300 and 11040.

1.05 SYSTEM DESCRIPTION

- A. Blower unit meet the following requirements:
- B. Operating Conditions:

DIP Tank Blower

1.	Quantity	one (1)
2.	Discharge Pressure	5.0 psig
3.	Maximum Motor Horsepower	5 HP
4.	Max. Brake Horsepower	3 BHP
5.	Motor RPM	3485 RPM
6.	Motor Voltage	460 Volt
7.	Motor Phase	3
8.	Inlet Volume - SCFM	75 SCFM
9.	Elevation	10 feet MSL
10.	Inlet Air Temperature	100°F
11.	Blower RPM	3,166 RPM

- C. Manufacturer: The blower shall be manufactured by Aerzen USA Corporation, GM3S DN 50 with F3 sound enclosure or equal.

1.06 DELIVERY, STORAGE AND HANDLING

- A. All equipment shall be completely factory assembled, skid mounted, crated and delivered to protect against damage during shipment
- B. Factory assembled parts and components shall not be dismantled for shipment. Contractor shall not be required to do any jobsite assembly of the blower package and shall not disassemble any factory assembled component without blower manufacturer's written approval.

C. Finished surfaces of all exposed flanges shall be protected by wooden blank flanges, strongly built and securely bolted thereto.

D. Finished iron or steel surfaces not painted shall be properly protected to prevent rust and corrosion. No shipment shall be made until approved by the Contractor in writing.

1.07 MAINTENANCE

A. Spare Parts and tools

1. The following spare parts shall be supplied.
 - a. Air filter
 - b. Spare belt
 - c. 1 gallon of Delta Lube 6
2. Spare parts shall be properly bound and labeled for easy identification without opening the packaging and suitably protected for long term storage in a humid environment. One set of tools required for changing oil and performing belt maintenance shall be provided for each blower.

1.08 FABRICATION

A. Shop Prime Coating: Prime paint all components with gray Kem-Flash prime paint manufactured by Sherwin Williams Company or equal. Prime paint by the individual component manufacturer is not acceptable.

B. Shop Finish Coating: Finish paint all component parts before assembly with machine tool gray Kem-Lustral Enamel as manufactured by Sherwin Williams Company or equal. Field painting of blower equipment is not acceptable.

C. Paint shall meet Specification Section 09900.

PART 2 - PRODUCTS

2.01 POSITIVE DISPLACEMENT BLOWER

A. Each blower shall be of the horizontal, rotary, positive displacement type. Each assembly shall be rugged in construction and of such design that it may be disassembled and inspected without disturbing the inlet or discharge piping.

B. Casing shall be of one piece with separate head plates and shall be made of close grained gray cast iron suitably ribbed to prevent distortion under service conditions.

C. Fabricate drive end and gear end head plates of close-grained cast iron which are precision machined for exact bearings housing fit.

D. Impeller and shaft shall be made from common cast iron or cast iron machined steel. Impeller shall be of the straight, two lobe involute type and shall operate without rubbing and shall be positively timed by a pair of accurately machined heat-treated alloy steel, spur tooth, timing gears.

E. Each impeller/shaft shall be supported by double row ball or spherical roller bearings sized for a minimum of 50,000 hours of B-10 life.

F. Provide a lip type oil seal at each bearing, designed to prevent lubricant from leaking into the air stream. Provisions shall be made to vent the lubrication system to prevent any possible carryover of lubricant into air stream.

G. The timing gears and the bearings shall be splash oil lubricated from oil slingers mounted on the drive shaft and dipping in the oil. Sight glasses for oil level observation shall be provided. Grease lubricated bearings are acceptable on the drive end. Machines used for Filter Back wash application with a smaller gear diameter than 3" will not be considered.

2.02 ELECTRIC MOTORS

A. Provide a 3 phase, constant torque, TEFC 1800 RPM motor, 1.15 S.F., Premium efficiency suitable for mounting on a slide base and connecting to the blower shaft by a V-belt and sheave drive assembly. Motor shall have a cast iron frame and brackets. Motors with rolled steel frames are acceptable.

2.03 BLOWER PACKAGE ACCESSORIES

A. The blower packages shall be fabricated and assembled with the following accessories and shipped complete as a unit. Packages knocked down for shipment are not acceptable. Shipment to be made on flat bed open top type trailer.

B. Equipment Base: The base shall be built so that the blower and the motor are mounted to provide horizontal tensioning of the v-belt drive. The base shall be a minimum of 1/4" plate steel with angle legs and gussets. These items shall also have a minimum thickness of 1/4". The blower package base must weigh at least 80% of the blower weight. Bases constructed of all angle iron will not be acceptable.

C. Drive: Provide V-belt drive assembly consisting of Sheaves, quick detachable bushings, V-belts, and sliding motor base. Provide drive assembly with a 1.4 service factor based on motor nameplate horsepower.

D. Guard: Provide OSHA Style steel belt guard to enclose drive and belts. Design guard for easy removal. The guard shall be constructed to allow visual inspection of the drive system without removing the guard.

- E. Intake Filter: Provide the blower with a suitably sized air filter.
- F. Intake Silencer: Provide a heavy duty, all welded, noise attenuation unit constructed of carbon steel sheet and plate and featuring an acoustically treated outlet for pulse control.
- G. Discharge Silencer: Provide a heavy duty, all welded, noise attenuation unit constructed of carbon steel sheet and plate and featuring an acoustically treated outlet for pulse control.
1. Supports: Provide two (2), carbon steel, clamp type supports at each end of silencer for rigidly mounting silencer horizontally to the blower package base. Fasteners to be plated steel.
- H. Pressure Relief Valve: Provide weight type relief valve with proper sizing and weights for set point pressure.
- I. Check Valves: Provide threaded type, cast iron body, aluminum internals for mounting on blower discharge piping. Provide Flexi-Hinge Model 502-2" (Post Aeration) & Flexi-Hinge Model 502-4" (Filter Backwash) or equal.
- J. Discharge Butterfly Valve: Provide wafer type, resilient seated, lever operated, butterfly valve for isolating the blower. Furnish valve with cast iron body and disc of nodular iron; Stainless steel stem; Acetal Bushing; Buna-N seat; and 316 SS Torque plug.
- K. Discharge Pressure Gauge: Provide a stem mounted discharge pressure gauge on the blower package to be U.S. Gauge, McDaniel Instruments or equal.
1. Range: 0-15 psig.
 2. Accuracy: 1 percent of full scale.
 3. Dial: 2.5", 270 degree scale.
- L. Inlet Restriction Gauge: Provide each blower with a Dwyer Model 2020 inlet gauge to measure loss through the inlet filter or equal.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. The Contractor shall install the blower in accordance with the manufacturer's written instructions and as directed on site by the Manufacturer's representative. The Contractor shall be responsible for coordinating related items not covered in this section of the Specifications, such as piping, fittings, additional valves, supports, motor controls and wiring.

B. Blower and motor alignment shall be performed by representatives of the blower manufacturer. Prior to initial starting of blower, a written report shall be supplied to the Engineer by the blower manufacturer's service representative verifying alignment and motor rotation direction of each unit and certify that the blower is properly installed.

C. The blower and accessories shall be installed, tested, adjusted and installation certified by the blower supplier.

D. The blower supplier shall supply blower packages shipped completely pre-assembled. Only the electrical connections to the drive motor, pipe connections and anchoring in place shall be performed on site by the contractor.

3.02 EQUIPMENT MANUFACTURER'S SERVICE REPRESENTATIVE

A. Provide the services of a qualified factory certified representative for one (1) day of total installation inspection, start-up and training.

*** END OF SECTION ***

DIVISION 11 – EQUIPMENT

SECTION 11400

PRE-PURCHASED MEMBRANE CASSETTES

PART 1 – GENERAL

1.01 SCOPE OF WORK

A. The Owner pre-purchased replacement membrane modules within cassettes in advance of project bidding due to the long lead time required for the manufacture of these units. Contractor shall install the Owner purchased hollow-fiber membrane cassettes to replace existing operating membrane units. Furnish and install other appurtenances as shown on the contract drawings and described herein.

B. All required labor, materials and equipment not included in the Veolia scope of membrane cassette supply shall be provided by the Contractor and included within the lump sum fee schedule Bid Item A3.

C. The scope of supply includes equipment, materials, and field services.

D. Contractor shall provide facilities for storage of the crated cassettes as described herein.

1.02 RELATED SECTIONS

A. Section 01100: Summary of Work

B. Section 14300: Hoists and Cranes

1.03 SUBMITTALS

A. The Contractor shall provide a description of the facility and location for the short-term storage of the six (6) Veolia membrane cassette units.

B. Engineer shall review, but not approve, the proposed membrane storage facility. Engineer shall review for compliance to manufacturer requirements only.

PART 2 – PRODUCTS

2.01 MEMBRANE CASSETTES

- A. Veolia ZW 500D Membrane Units:
1. Membrane cassettes are shipped in either a plywood or Cartonplast packing crate.
 2. The cassette itself is sealed in a plastic bag to retain moisture and prevent damage to the membranes due to drying.

PART 3 – EXECUTION

- A. The Contractor shall provide facilities and services required for the storage, maintenance, protection and security of the equipment and materials delivered by Veolia.
- B. Follow these conditions:
1. Equipment and materials shall be stored in assigned lay-down areas.
 2. Stored equipment and materials shall be adequately supported and protected to prevent damage.
 3. Stored equipment and materials shall be adequately supported and protected to prevent damage.
 4. Equipment shall be moved into the permanent building or onto its permanent foundation as soon as construction permits.
 5. Stored materials and equipment shall not be allowed to contact the ground. In warehouses that do not have dry concrete or suspended floors, materials and equipment shall be stored on platforms or shoring.
 6. Indoor storage furnished by the Installer shall consist of suitable construction trailers or portable enclosures and shall be weather-tight, well ventilated, and secure against theft and vandalism.
 7. Access doors shall be adequate to accommodate the movement and handling of materials and equipment to be stored and shall be equipped with secure locks.
 8. Membrane cassettes/racks/frames will be stored upright on a level surface.
 9. The membrane cassette crates must remain closed until the Installer begins membrane installation to prevent permanent membrane damage due to drying out.

10. If upon removal from storage, mold is discovered on the membrane fibers, carefully repackage and contact Veolia for direction.

C. New modules preserved with glycerin solution, bagged and factory sealed, may be stored for up to 12 months. When storing bagged modules/elements, store in a sheltered area protected from freezing, direct sunlight, extreme heat and winds that could accelerate drying. The module/element should always be kept bagged and sealed.

D. It is important to note that ZeeWeed membranes should not be allowed to dry out as membrane properties will be adversely affected. Drying may result in irreversible damage to the membranes.

*** END OF SECTION ***

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DIVISION 11 - EQUIPMENT

SECTION 11601

SAFETY EQUIPMENT

PART 1 - GENERAL

1.01 GENERAL

A. The Contractor shall furnish and install safety equipment in compliance with Section 01600, the following specifications, and as shown, the Contract Drawings.

B. All items shall be new and of current design, free from defects, dents, rust, and other imperfections.

1.02 RELATED SECTIONS

A. Section 01300: Submittals.

B. Section 01600: Materials and Equipment

1.03 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Product Data: Manufacturer's data and product information, indicating the sizes, descriptions, capacities, test certifications, and other descriptive data showing that the product complies with the contract requirements.

C. Installer's Certification: Furnish proof of installer's current certification and approval by manufacturer in the form of the installer's current certificate issued by the manufacture.

D. Shop Drawings: For fabrication showing the complete fall protection system. Layout drawings of each system in relation to the supporting structure indicating the locations of properly labeled components.

E. Product Certificate: Provided by the manufacturer

F. Systems Manual:

1. Maintenance Procedures: Including parts list and maintenance requirements for all equipment.

2. Operation Procedures: Indicating proper use of equipment for safe operation of the systems.
 3. Manufacturer's catalog data indicating the sizes, descriptions, capacities, test certifications, and other descriptive data showing sufficient detail that the product complies with the contract requirements.
- G. Record Documents: Include a copy of Record Drawings in the systems manual.
- H. Warranty: Submit manufacturer warranty.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Minimum 25-year experience manufacturing similar products.
- B. Installer Qualifications: Minimum 2-year experience installing similar products, authorized, trained, and certified by manufacturer.
- C. Coordination: Coordinate the installation of horizontal fall protection system with structural supports and finish materials.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Section 01600.

1.06 REFERENCES

- A. American National Standards Institute (ANSI):
1. ANSI Z359.1 – Safety Requirements for Personal Fall Arrest Systems, Subsystems and Components.
 2. ANSI Z359.6 – Specifications and Design Requirements for Active Fall Protection Systems.
- B. Occupational Safety and Health Administration (OSHA):
1. OSHA 29 CFR 1926.502 – Fall Prevention Systems and Criteria and Practices.
 2. OSHA 29 CFR 1910.29 General Industry.

1.07 WARRANTY

- A. Manufacturer's 10-year minimum corrosion resistance and product warranty.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: 3M Fall Protection Business, which is located at: 3833 Sala Way; Red Wing, MN 55066-5005;
- B. Substitutions will be considered in accordance with Section 016000 – Product Requirements.

2.2 FALL PROTECTION CABLE SYSTEMS; FORCE MANAGEMENT ANCHOR AND CABLE

A. Basis of Design: 3M DBI-SALA Sealed Block Self Retracting Lifeline 3400135, Stainless Steel Cable, Swivel Snap Hook, 50 ft, Class 1, ANSI Manufactured by 3M Fall Protection. Horizontal cable fall protection system for maintenance including end anchors, intermediate cable supports, variable cable supports, traveler and corner cable supports as required.

- 1. Maximum span of 50 feet and provides continuous hands free access for the user of the fall protection system.

B. Performance Requirements:

- 1. Structural Performance: Fall protection systems shall withstand the effects of loads and stresses within limits and under conditions required by:
 - a. CSA Z259.16.
 - b. ANSI Z359.6
 - c. OSHA 1926.502.
 - d. System capable of spanning 50 feet.
 - e. Allowable Force on Structure: 5,000 lbs. maximum.
 - f. Maximum Free Fall: 2 feet.

C. Components:

- 1. Cable: 316 Stainless Steel Wire.
- 2. End Anchorage Connector: 316 Stainless Steel, electro-polished and Lot Numbered.
- 3. Tensioner: 316 Stainless Steel.
- 4. Dampener: 316 Stainless Steel with thermal cyclic loading.
- 5. Intermediate Guide: 316 Stainless Steel, electro-polished.
- 6. Finish type for modular end, corner, and intermediate anchors: a. Anchorage Baseplates: Anodized aluminum plates designed and tested to be used with modular end, corner and intermediate anchors.

D. Materials:

1. Primary Cable Assembly Components: Stainless steel, ASTM A666, Type 316.
2. Aluminum: 6061 aluminum alloy.
3. Aluminum: 6082 aluminum alloy.

E. Fabricated Supports:

1. Carbon steel with corrosion resistant finish. Steel Plates, Shapes.
2. Bars: ASTM A36 Steel Tubing: ASTM A500, cold formed.
3. Welding rods and bare electrodes: Select according to AWS specifications or metal alloy welded.

F. Connectors:

1. Comply With:
 - a. OSHA regulation 1926.502.
 - b. ANSI Z359.1.
 - c. CSA Z259.12-11.

G. Fabrication:

1. Fabricate anchoring devices as recommended by the manufacturer to provide adequate support for intended use.
2. Shop fabricate required anchorage posts using structural steel with material test certificates for full material traceability.

H. Finishes:

1. Stainless Steel: Electropolished for corrosion resistance.
2. Structural Steel: Zinc Galvanized for corrosion resistance.
3. Aluminum: Anodized.
4. Aluminum: PVC coated.

I. Accessories:

1. Signage: Signs and system identification tags.

PART 3 – EXECUTION

3.01 INSTALLATION AND LOCATION

- A. Install in accordance with manufacturer's instructions.

B. Location for equipment placement is to be selected during construction by the Engineer, as shown on the Contract Drawings, or as detailed in the Schedule which follows.

C. Anchor attached equipment securely in place.

*** END OF SECTION ***

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DIVISION 13 – SPECIAL CONSTRUCTION

SECTION 13100

WASTE BACKWASH SETTLING TANK

PART 1 – GENERAL

1.01 SCOPE OF WORK

- A. Furnish and erect a glass-coated, bolted-steel waste backwash settling tank, including foundation, tank structure and tank appurtenances as shown on the contract drawings and described herein.
- B. All required labor, materials and equipment shall be included.

1.02 QUALIFICATIONS OF TANK SUPPLIER

- A. The Engineer's selection of factory applied glass-fused-to-steel bolt together tank construction for this facility has been predicated upon the design criteria, construction methods specified, and optimum coating for resistance to internal and external tank surface corrosion.
- B. The bidder shall offer a new tank structure as supplied from a manufacturer specializing in the design, fabrication and erection of factory applied glass-fused-to-steel, bolt together tank systems.
- C. Strict adherence to the standards of design; fabrication; erection; product quality; and long term performance, established in this Specification will be required by the Owner and Engineer.
 - 1. Tank or Dome substitutions which cause engineering and contract changes - the tank installation as shown on the plans and specified herein, is based on the equipment furnished by one manufacturer. A tank which is offered as a substitute to the specific requirements of these Specifications and which differs in detail and arrangement from that shown may require changes in design and construction. All costs which result from such changes in design and construction are to be borne entirely and unconditionally by the Contractor; said costs to included but not be limited to structural, piping, mechanical and electrical changes and all engineering costs incurred as a result of the substitution, in the revision of Plans and Specifications, review of design changes by others, preparation of change orders, and any other costs directly resulting from said substitution.

D. Tank supplier shall have supplied and constructed five (5) tanks presently in U.S.A. potable water service, of size and character specified herein, operating satisfactorily for a minimum of five (5) years. The tanks listed shall have been manufactured in the present production facility of the tank supplier; not by a predecessor company in a different facility.

1.03 SUBMITTAL DRAWINGS AND SPECIFICATIONS

A. Construction shall be governed by the Contact Documents.

B. A complete set of structural calculations shall be provided for the tank structure and foundation. All such submissions shall be stamped by a Registered Professional Engineer licensed in the state of project location, as well as, by a Registered Professional Engineer employed on the tank manufacturer's engineering staff.

C. The tank manufacturer's and installing contractor's standard published warranty shall be included with submittal information.

PART 2 – PRODUCTS

2.01 MANUFACTURER

A. The glass-coated, bolted steel potable water storage tank shall be by:

1. AQUASTORE®, CST Industries.
2. Or Equal.

B. The tank shown on the contract drawings and specified herein is an Aquastore Tank System as manufactured by CST Industries of Kansas City, Missouri.

1. For equal alternative Tank Suppliers, Contractor shall provide all documentation and qualification reference lists as required above with bid submittal.
2. All products provided for the contract, whether named product or equal alternative, shall be suitable for the intended function and indicated installation.

C. A level sensor and transmitter shall be located near the top of the tank accessible to the platform and used to continuously monitor liquid level. Level sensor, transmitter and mounting hardware shall be provided and installed by Tank Manufacturer as specified in Section 13400. Tank manufacturer shall coordinate with subcontractors under Section 17001 on 4-20 mA signal from transmitter. Level transmitter display panel shall be provided with adequate cable length to reach RTU control cabinet in the Electrical Room of the Water Treatment Plant.

D. Tank manufacturer shall coordinate with control systems subcontractor on any necessary controls and/or signal wiring for operation of the waste backwash settling tank.

2.02 DESIGN CRITERIA

A. Tank Size

1. The factory coated glass-fused-to-steel, bolt together tank shall have a nominal diameter of 22.38 feet, with a nominal sidewall height (to roof eave) of 14.68 feet.

B. Tank Capacity

1. Tank capacity shall be nominal 41,718 gallons, to include 6 inches of Freeboard (nominal, U.S. gallons).

C. Floor Elevation

1. Finished floor elevation shall be set at the elevation shown on the Contract Drawings.

D. Tank Design Standards

1. The materials, design, fabrication and erection of the bolt together tank shall conform to the AWWA Standard for "Factory Coated Bolted Steel Tanks For Water Storage" - ANSI/AWWA D103, latest revision.
2. The tank coating system shall conform solely to Section 12.4 of ANSI/AWWA D103. NOTE: Baked-on epoxy painted or galvanized bolt-together tanks are not considered equal.
3. The vitreous coating on the tank, bolt head encapsulation material, and joint sealant shall have been approved for listing under ANSI/NSF Standard 61 for Indirect Additives.
4. The tank manufacturer shall be ISO-9001 certified to assure product quality.
5. The tank manufacturer shall undergo an annual FM (Factory Mutual) inspection of their glass-coated, bolted-steel tank factory & provide written proof thereof to assure quality.

E. Design Loads

- | | | |
|----|------------------------|----------------------------|
| 1. | Specific Gravity | 1.0 |
| 2. | Wind Velocity | 120 mph / IBC 2018 |
| 3. | Allowable Soil Bearing | 1,500 psf |
| 4. | Roof Snow Load | 25 psf |
| 5. | Seismic per | IBC 2018 or latest edition |

2.03 MATERIALS SPECIFICATIONS

A. Plates and Sheets

1. Plates and sheets used in the construction of the tank shell, tank floor and tank roof, shall comply with the minimum standards of AWWA D103, Section 4.4.
2. Design requirements for mild strength steel shall be ASTM A1011 Grade 30 with a maximum allowable tensile stress of 14,566 psi per AWWA D103.
3. Design requirements for high strength steel shall be ASTM A1011 Grade 50 with a maximum allowable tensile stress of 26,000 psi per AWWA D103.
4. The annealing effect created from the glass coated firing process shall be considered in determining ultimate steel strength. In no event shall a yield strength greater than 50,000 psi be utilized for calculations detailed in AWWA D103, Sections 5.4 and 5.5.
5. Multiple vertical bolt line sheets and plates of ASTM A1011 Grade 50 only shall be manufactured such that holes are staggered in the vertical bolt lines and that no two adjoining holes are in-line horizontally, except at the center of the sheet or plate.
 - a. Bolt seam design shall generally be in accordance with the requirements of AWWA D103 section 5.5.2; bolt spacing may be adjusted in the vertical bolt lines to increase the net section and improve joint efficiency to a maximum of 85%.
 - b. Double sheeting of tank panels shall not be permitted to achieve structural sidewall thickness requirements.

B. Rolled Structural Shapes

1. Material shall conform to minimum standards of ASTM A36 or ASTM A992
2. Horizontal Wind Stiffeners
3. Design requirements for intermediate horizontal wind stiffeners shall be of the "web truss" design with extended tail to create multiple layers of stiffener, permitting wind load to transfer around tank.
4. Web truss stiffeners shall be of steel with hot dipped galvanized coating.
5. Rolled steel angle stiffeners are not permitted for intermediate stiffeners.

C. Bolt Fasteners

1. Bolts used in tank lap joints shall be 1/2" - 13 UNC- 2A rolled thread, and shall meet the minimum requirements of AWWA D103, Section 4.2.
2. Bolt Material
 - a. SAE J429 (1" and 1-1/4" bolt length) heat treated to:
 - b. Tensile Strength - 120,000 psi Min.
 - c. Proof Load - 85,000 psi Min.
 - d. Allowable shear stress – 29,454 psi.
 - e. SAE J429 (>1-1/4" bolt length) heat treated to:

- f. Tensile Strength - 150,000 psi Min.
- g. Proof Load - 120,000 psi Min.
- h. Allowable shear stress - 36,818 psi.
- 3. Bolt Finish - Zinc, mechanically deposited.
 - a. 2.0 mils minimum - under bolt head, on shank and threads.
- 4. Bolt Head Encapsulation
 - a. High impact polypropylene co-polymer encapsulation of entire bolt head up to the splines on the shank.
 - b. Natural resin with UV (ultraviolet) light inhibitor. Color to be black.
- 5. All tank shell bolts shall be installed such that the head portion is located inside the tank, and the washer and nut are on the exterior.
- 6. All lap joint bolts shall be properly selected such that threaded portions will not be exposed in the "shear plane" between tank sheets. Also, bolt lengths shall be sized so as to achieve a neat and uniform appearance. Excessive threads extending beyond the nut after torquing will not be permitted.
- 7. All lap joint bolts shall include a minimum of four (4) splines on the underside of the bolt head at the shank in order to resist rotation during torquing.

D. Sealants

- 1. The lap joint sealant shall be a one component, moisture cured, polyurethane compound. The sealant shall be suitable for contact with potable water and meet applicable FDA Title 21 regulations, as well as, ANSI/NSF Additives Standard 61.
- 2. The sealant shall be used to seal lap joints, bolt connections and sheet edges. The sealant shall cure to a rubber like consistency, have excellent adhesion to the glass coating, have low shrinkage, and be suitable for interior and exterior exposure.
- 3. Sealant curing rate at 73° F and 50% RH
 - a. Tack-free time: 6 to 8 hours.
 - b. Final cure time: 10 to 12 days.
- 4. The sealant shall be ESPC System Sealer No. 98.
- 5. Neoprene gaskets and tape type sealer shall not be used.

E. Glass Coating Specification

- 1. Surface Preparation
 - a. Following the decoiling and shearing process, sheets shall be steel grit-blasted on both sides to the equivalent of SSPC-10. Sand blasting and chemical pickling of steel sheets is not acceptable.
 - b. The surface anchor pattern shall be not less than 1.0 mil.
 - c. These sheets shall be evenly oiled on both sides to protect them from corrosion during fabrication.
- 2. Cleaning
 - a. Sheet edges of sidewall and floor plates shall be mechanically rounded and flame coated with 316 stainless steel prior to glass

coating. Glass coating of the sheet edges shall be similar to the flat panel surfaces. The process shall be applied to all four sheet edges, and shall be equal to *EDGECOAT*[™] by CST Industries or equal.

- b. After edge coating and prior to application of the coating system, all sheets shall be thoroughly cleaned by a caustic wash and hot rinse process followed immediately by hot air drying.
 - c. Inspection of the sheets shall be made for traces of foreign matter or rust. Any such sheets shall be re-cleaned or grit-blasted to an acceptable level of quality.
3. Coating
- a. All sheets shall receive one coat of a catalytic nickel-oxide glass precoat to both sides and then air dried.
 - b. Another coat of milled cobalt blue glass shall be applied to both sides of the sheets and then dried.
 - c. A third coat of milled titanium dioxide white glass shall be applied to all wetted surfaces which must be an 18 to 22 percent titanium dioxide reinforced mixture. The specified coating shall be Aquastore Vitrium. An acceptable alternate three coat two fire system must be submitted for approval prior to the bid.
 - d. The sheets shall then be fired at a minimum temperature of 1500° F in strict accordance with the manufacturer's ISO 9001 quality process control procedures, including firing time, furnace humidity, temperature control, etc.
 - e. The dry film interior coating thickness shall be 10.0 to 18.0 mils minimum. The finished inside color shall be white.
 - f. The dry film exterior coating thickness shall be 7.0 to 15.0 mils minimum. The finished exterior color shall be cobalt blue.
 - g. The same glass coating as applied to the sheet surfaces shall be applied to the exposed edges.
4. Factory Inspection
- a. The manufacturer's quality system shall be ISO 9001 certified.
 - b. Chemical Resistance of Glass Coating
 - (1) Every batch of component frits shall be individually tested in accordance with PEI Test T- 21 (Citric Acid at Room Temperature).
 - c. Factory Holiday Test
 - (1) A dry volt test using a minimum of 1,100 volts is required.
 - (2) Frequency of the test shall be every sheet. Any sheet registering a discontinuity shall be rejected
 - (3) All inside sheet surfaces shall be holiday free.
 - d. Measurement of Glass Thickness
 - (1) Glass thickness shall be measured using an electronic dry film thickness gage (magnetic induction type). The thickness gage shall have a valid calibration record.
 - (2) Frequency of the test shall be every tenth sheet. The thickness of the glass shall be between 10.0 and 18.0 mils.

- e. Measurement of Color
 - (1) The exterior color of the sheets shall be measured using an approved colorimeter. The colorimeter shall have a valid calibration record.
 - (2) Frequency of the test shall be every tenth sheet. The color must fall within the tolerance specified by the tank manufacturer, else the panel shall be rejected.
- f. Impact Adherence Test
 - (1) The adherence of the glass coating to the steel shall be tested in accordance with ASTM B916-01. Any sheet that has poor adherence shall be rejected.
 - (2) Frequency of this test shall be one sheet per gage lot run minimum.
- g. Fishscale Test
 - (1) The glass coating shall be tested for fishscale by placing the full size production sheets in an oven at 400°F for one hour. The sheets will then be examined for signs of fishscale. Any sheet exhibiting fishscale shall be rejected and all sheets from that gage lot will be similarly tested.
 - (2) Frequency of this test shall be one sheet per gage lot run minimum.

F. Packaging

- 1. All approved sheets shall be protected from damage prior to packing for shipment.
- 2. Heavy paper or plastic foam sheets shall be placed between each panel to eliminate sheet-to-sheet abrasion during shipment.
- 3. Individual stacks of panels will be wrapped in heavy mil black plastic and steel banded to special wood pallets built to the roll-radius of the tank panels. This procedure eliminates contact or movement of finished panels during shipment.
- 4. Shipment from the factory to the job site will be by truck, hauling the tank components exclusively. No common carrier, drop, or transfer shipments.

PART 3 – EXECUTION

3.01 ERECTION

A. Foundation

- 1. The tank foundation is a part of this contract.
- 2. The tank foundation shall be designed by the manufacturer to safely sustain the structure and its live loads.

3. Tank footing design shall be based on a minimum 1,500 psf soil bearing capacity or greater.

B Tank Floor

1. Concrete Floor
 - a. The floor design is of reinforced concrete with an embedded glass coated steel starter sheet per AWWA D103-09 section 13.4.6 and the manufacturer's design, and is an integral element of the tank assembly; therefore, the tank foundation and floor slab (performed in two separate pours) with embedded starter sheet shall be constructed by the tank supplier using manufacturer trained personnel regularly engaged in this type of tank construction.
 - b. Leveling of the starter ring shall be required and the maximum differential elevation within the ring shall not exceed 1/8 inch, nor exceed 1/16 inch within any 10 feet of length.
 - c. A leveling plate assembly (per Harvestore Products, Inc. - U.S. Patent No. 4,483,607), consisting of two 18" anchor rods (3/4" dia.) and a slotted plate (3 1/2" X 11" X 3/8" thk) shall be used to secure the starter ring, prior to encasement in concrete. Installation of the starter ring on concrete blocks or bricks, using shims for adjustment, is not permitted. The foundation with anchor bolts/leveling plates shall be a separate pour from the concrete floor.
 - d. Two water stop seals made of a butyl rubber elastomer special for this application shall be placed on the inside surface of the starter ring below the concrete floor line. These materials shall be installed as specified by the tank manufacturer.
 - e. Tank floor shall be sloped to the drain located at the center of the tank as shown on the Contract Drawings.

C. Sidewall Structure

1. Field erection of the glass-coated, bolted-steel tank shall be in strict accordance with the procedures outlined in the manufacturer's erection manual, and performed by an authorized dealer of the tank manufacturer, regularly engaged in erection of these tanks.
2. Specialized erection jacks and building equipment developed and manufactured by the tank manufacturer shall be used to erect the tanks.
3. Particular care shall be taken in handling and bolting of the tank panels and members to avoid abrasion of the coating system. Prior to liquid test, all surface areas shall be visually inspected by the Engineer.
4. An electrical holiday test shall be performed during erection using a nine (9) volt leak detection device. All electrical leak points found on the inside surface shall be repaired in accordance with manufacturer's published touch up procedure using urethane sealer.

5. The placement of sealant on each panel may be inspected prior to placement of adjacent panels. However, the Engineer's inspection shall not relieve the bidder from his responsibility for liquid tightness.
6. No backfill shall be placed against the tank sidewall without prior written approval and design review of the tank manufacturer. Any backfill shall be placed according to the strict instructions of the tank manufacturer.

D. Roof

1. Tank shall include a radially sectioned roof fabricated from glass-coated, bolted steel panels, as produced by the tank manufacturer, and shall be assembled in a similar manner as the sidewall panels utilizing the same sealant and bolting techniques, so as to assure a water/air tight assembly. The roof shall be clear span and self-supporting. Both live and dead loads shall be carried by the tank walls. The exterior coating finish shall be cobalt blue glass. The manufacturer shall furnish a roof opening which shall be placed near the outside tank ladder and which shall be provided with a hinged cover and a hasp for locking. The opening shall have a clear dimension of at least twenty-four (24") inches in one direction and eighteen (18") inches in the other direction. The opening shall have a gasketed weather-tight cover.

E. Roof Vent

- a. A properly sized vent assembly in accordance with AWWA D103 shall be furnished and installed above the maximum water level of sufficient capacity so that at maximum possible rate of water fill or withdrawal, the resulting interior pressure or vacuum will not exceed 0.5" water column.
- b. The overflow pipe shall not be considered to be a tank vent.
- c. The vent shall be constructed of aluminum.
- d. The vent shall be so designed in construction as to prevent the entrance of birds and/or animals by including an expanded aluminum screen (1/2 inch) opening. An insect screen of 23 to 25 mesh polyester monofilament shall be provided and designed to open should the screen become plugged by ice formation.

F. Appurtenances (per AWWA D103, Section 7)

1. Pipe Connections
 - a. Where pipe connections are shown to pass through tank panels, they shall be field located, saw cut, (acetylene torch cutting or welding is not permitted), and utilize an interior and exterior flange assembly. ESPC Sealer No. 98 shall be applied on any cut panel edges or bolt connections. Pipe connections shall be 304 stainless steel.
 - b. Overflow piping shall be 8-inch diameter schedule 80 PVC.

2. Outside Tank Ladder
 - a. An outside tank ladder shall be furnished and installed as shown on the contract drawings.
 - b. Ladders shall be fabricated of aluminum and utilize grooved, skid-resistant rungs.
 - c. Step-off platforms shall be fabricated of galvanized steel.
 - d. The exterior ladder will be equipped with an OSHA approved safety rail/cable.
 - e. A hinged, lockable gate shall be installed at the base of the ladder safety cage to deter unauthorized access to the top of the tank. The Owner shall provide and install the lock.
3. Sidewall Access Manway
 - a. One sidewall access manway shall be provided as shown on the contract drawings in accordance with AWWA D-103.
 - b. Such manway shall be a minimum of 24 inches in diameter and shall include a properly designed reinforcing frame and cover plate.
4. Identification Plate A manufacturer's nameplate shall list the tank serial number, tank diameter and height, and maximum design capacity. The nameplate shall be affixed to the tank exterior sidewall at a location approximately five (5') feet from grade elevation in a position of unobstructed view.
5. Cathodic Protection
 - a. The Manufacturer will provide a cathodic protection system consisting of sacrificial magnesium anodes which provide corrosion protection for the portions of the structure immersed in liquid. The anodes are equally spaced (to the nearest vertical bolt line) around the structure, attached to the floor, and bolted through existing shell sheet bolt holes. In special cases where anodes may be spaced differently, a layout plan will be provided as part of the submittal package. Lead wires and buss bars are used to ensure continuity between anodes and structure shell sheets.
 - b. Electrical continuity between all tank sidewall panels shall be the responsibility of the tank manufacturer.
 - c. The design life shall be calculated at 10 years. The cathodic protection system shall be designed for protection of uncoated steel surfaces in the product zone, including rebar within an uncoated concrete tank floor.
6. Provide other tank appurtenances as shown on the Contract Drawings.

G. Field Testing

1. Hydrostatic
 - a. Following completion of erection and cleaning of the tank, the structure shall be tested for liquid tightness by filling tank to its overflow elevation.

- b. Any leaks disclosed by this test shall be corrected by the erector in accordance with the manufacturer's recommendations.
- c. Water required for testing shall be furnished by the Owner at the time of tank erection completion, and at no charge to the tank erector. Owner will provide water for one (1) test. Disposal of test water shall be the responsibility of the Contractor.
- d. Labor and equipment necessary for tank testing is to be included in the price of the tank.

3.02 Warranty

A. Manufacturer's guarantee through the Contractor shall extend two (2) years from the date of Substantial Completion of the project. If within this period the water storage tank or any part thereof proves to be defective in material or workmanship upon examination by the manufacturer, the manufacturer will supply replacement part F.O.B. the Riddle Farm WWTP site, or the manufacturer, at its option, will repair or allow credit for such part.

*** END OF SECTION ***

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DIVISION 13 – SPECIAL CONSTRUCTION

SECTION 13400

INSTRUMENTATION

PART 1 – GENERAL

1.01 DESCRIPTION

A. Description of Work: Scope of work under this section shall include all piping, wiring, accessories, and appurtenant equipment necessary for a complete instrumentation system in accordance with these Specifications.

1.02 SUBMITTALS

A. Submit complete Shop Drawings, manufacturer's certificates, and product data for all equipment in accordance with Section 01300.

B. Submit operation and maintenance manuals for all equipment in accordance with Section 01300.

1.03 QUALITY ASSURANCE

A. All work shall be certified to be in accordance with ISO 9001.

B. Instrumentation systems shall be installed and calibrated to deliver a fully functioning, complete, integrated system.

C. If the instrumentation fails to function properly under specified conditions within a 2-year guaranty period, it shall be responsibility of the system manufacturer to correct at no additional cost.

PART 2 – PRODUCTS

2.01 GENERAL

A. Provide instrumentation of manufacturer's latest and proven design. These Specifications and Drawings direct attention to certain features but do not purport to cover all details entering the total design of the instrumentation ~~and control system.~~

B. Provide controls complete, including all necessary auxiliary relays to require only wiring and connections to electrically operated equipment.

C. Motor operated or electrically operated equipment shall have a separate 120-volt control circuit protected by a circuit breaker.

D. All fuses or switches required by the instrumentation manufacturer for his equipment shall be provided with the equipment. All instruments provided with an external power supply shall have an internal "ON-OFF" switch.

E. The drawings and specifications indicate the primary energy sources that will be provided. Any additional devices required to obtain proper operation of the instrumentation system from these energy sources shall be furnished with the instrumentation.

2.02 FLOW MEASUREMENT

- A. Internal Recycle Flow Meters:
- | | |
|--------------------------------|---------------------------------|
| 1. Quantity: | Two (2) |
| 2. Type: | Electromagnetic |
| 3. Nominal Diameter, Material: | 4 Inches, Ductile Iron |
| 4. Operating Ranges: | 15 – 450 GPM |
| 5. Low Flow cut off: | 15 GPM |
| 6. Meter Location: | Internal Recycle Piping |
| 7. Local Indication: | Instantaneous & Totalizer (GPM) |
| 8. Indication Location: | Handrail Mounted Device |
| 8. Additional Signal Output: | 4-20 mA to Process PLC |
| 9. Manufacturer: | Siemens or equal |

2.03 WATER LEVEL SENSOR

- A. Pressure Guage
- | | |
|-----------------------------------|---|
| 1. Quantity: | One (1) |
| 2. Type: | Ultrasonic level measurement |
| 3. Monitor Location: | Waste Backwash Settling Tank |
| 4. Manufacturer and Model Number: | Siemens Sitrans LU 240 or Equal |
| 5. Range: | 0 to 40 feet |
| 6. Connection | 3" flanged mounting adapter |
| 7. Accessories: | 2" NPT threaded
ETFE Transducer
4-20mA to level indicator,
trending, programmable
-Other accessories shown of the
Contract Drawings for a complete
and functional system. |

2.04 WATER LEVEL SENSOR FLOW CONTROLLER

- A. Level Sensor
1. Quantity: One (1)
 2. Type: Ultrasonic level measurement
 3. Monitor Location: Effluent Pump Well
 4. Manufacturer and Model Number: Siemens Sitrans LU 240 or equal
 5. Range: 0 to 20 feet
 6. Connection: FMS 200 mounting box bracket
 7. Accessories: 2" NPT threaded
ETFE Transducer
4-20mA to programmable level indicator, valve controller, process PLC
-Other accessories shown of the Contract Drawings for a complete and functional system.

PART 3 – EXECUTION

3.01 INSTALLATION AND FIELD QUALITY CONTROL

A. The Contractor shall install all equipment in strict accordance with the manufacturer's recommendations and the requirements of Section 11040 – EQUIPMENT GENERAL PROVISIONS. The Contractor shall make all necessary adjustments to equipment in order to provide complete and satisfactory operation upon completion of the Contract. Start-up: Check-out of final installation, start-up, calibration, and instruction of operating personnel shall be performed by qualified or authorized representative of the manufacturer.

*** END OF SECTION ***

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DIVISION 14 – CONVEYING SYSTEMS

SECTION 14300

HOISTS AND CRANES

PART 1 - GENERAL

1.01 DESCRIPTION

- A. The Contractor shall furnish and install three portable hoist systems including, but not limited to, hoists, trolleys, cranes, and all appurtenances and accessories.
- B. Related Work Specified Elsewhere:
 - 1. Section 05500: Metal Fabrications
 - 2. Section 11040: Equipment General Provisions

1.02 SUBMITTALS

- A. Submit complete shop drawings and product data for all equipment in accordance with Section 1300–SUBMITTALS.
- B. Submit operation and maintenance information for all equipment, as specified in Section 1300–SUBMITTALS.

1.03 QUALITY ASSURANCE

- A. All structural steel construction shall be in accordance with the AISC Specifications for Design, Fabrication and Erection of Structural Steel for Building latest edition.
- B. All welding shall conform to AWS D14.1 - Specifications for Welding Industrial and Mill Cranes. Where field welding of equipment is required, it shall be in accordance with the manufacturer's recommendations.
- C. All equipment furnished under these specifications shall incorporate the safety requirements of ANSI B30.11 - Safety Code for Underhung Cranes and Monorail Systems.
- D. All electrical shall comply with NEC.

PART 2 - PRODUCTS

2.01 GENERAL

A. Trolleys: Steel frame, flanges wheels with hardened treads and ball or roller bearings. Trolleys adaptable to run on beam size, and shape as indicated on the Drawings.

B. Cranes: Lower flange running type with chain operator box construction of weldments fabricated from steel channel sections or plate. Provide plain flanged wheels with hardened treads and double row prelubricated ball bearings. Each truck to have side rollers on both sides of rail, stop plates, and bumpers prelubricated ball bearings. Each truck to have side rollers on both sides of rail, stop plates, and bumpers each end.

C. Load Chain: Zinc plated chain and hooks.

D. Hoists: High strength frame and housing suitable for frequent lifting operations. Hoist will include a load limiter to prevent overloading. Gearings, bearings, rotating parts, sealed as specified.

2.02 RETURN PUMPS

A. Acceptable Manufacturers:

1. Crane – CM Lodestar (Supplier: Sievert Crane and Hoist – Attn: Bruce Peiffer: 708-405-5157).
2. Or Approved Equal.

B. Equipment Required:

- | | | |
|----|--------------------------|--------|
| 1. | Number of Systems | 1 |
| 2. | Cranes | 4265S1 |
| 3. | System Capacity | 1 ton |
| 4. | Hoist Lift Required | 33 FT. |
| 5. | Chain Container Required | Yes |

2.02 INTERNAL RECYCLE PUMPS

A. Acceptable Manufacturers:

1. Chester Hoist ELM-2 (Supplier: Sievert Crane and Hoist – Attn: Bruce Peiffer: (708-405-5157).
2. Or Approved Equal.

C. Equipment Required:

- | | | |
|----|--------------------------|--------|
| 1. | Number of Systems | 1 |
| 2. | Hoist | EML1 |
| 3. | System Capacity | 1 ton |
| 4. | Hoist Lift Required | 33 FT. |
| 5. | Chain Container Required | Yes |

2.03 MEMBRANE CASSETTES

A. Acceptable Manufacturers:

1. Hoist – Chester Hoist (Supplier: Sievert Crane and Hoist – Attn: Bruce Peiffer: 708-405-5157).
2. Or Approved Equal.

B. Equipment Required:

- | | | |
|----|--------------------------|--------|
| 1. | Number of Systems | 1 |
| 2. | Hoist Model No. | ELM-2 |
| 3. | System Capacity | 2 Ton |
| 4. | Hoist Lift Required | 25 FT. |
| 5. | Chain Container Required | Yes |

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install all equipment in accordance with the manufacturer's recommendations and instructions.
- B. Test equipment for proper operation. Adjust as necessary.

END OF SECTION

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DIVISION 16 - ELECTRICAL

SECTION 16010

ELECTRICAL DEMOLITION

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes:

1. Provide all labor, material and equipment to perform all electrical demolition as specified and as shown on the Drawings.
2. All equipment selected for demolition shall have power and communication cables de-energized and disconnected. All disconnected cables shall be removed.
3. All conduit shall be disconnected and removed from demolished equipment.
4. Contractor is responsible for making equipment scheduled for demolition safe for removal.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements and circuitry arrangements are as shown on the Drawings.
- B. Verify that abandoned wiring and equipment serve only abandoned facilities.
- C. Demolition work indicated on drawings are based on casual field observation and existing record documents. Report discrepancies to Engineer before disturbing any existing installation.
- D. The Contractor accepts existing conditions by starting demolition work.

3.02 PREPARATION

- A. Coordinate electrical power and telephone service outages with appropriate utility company and Owner.

- B. Investigate the existing conditions of electrical system in walls, floors and ceilings scheduled for removal.
- C. Disconnect and deliver to the Owner those items requested to remain the Owner's property.
- D. Provide temporary wiring and connections to maintain existing systems in service where needed. When work must be performed on energized equipment or circuits, use personnel experienced in such operations.

3.03 DEMOLITION OF ELECTRICAL FACILITIES

- A. Demolish electrical work under provisions of Section 02 and this section. All items indicated to be removed shall become Contractor's property and removed from the site, except for items specified or requested in writing to remain the Owner's property.
- B. For demolition in buildings that are to be removed as part of demolition work:
 - 1. Disconnect and remove existing power service equipment. Coordinate the disconnection and removal of utility transformers and meters with the power company.
 - 2. Coordinate the upgrade of the existing telephone service equipment. Coordinate the upgrade of telephone company equipment with the telephone company.
 - 3. Remove abandoned wiring to source of supply.
 - 4. Disconnect electrical devices and equipment serving equipment that has been (or will be) removed.

3.04 DISPOSAL OF DEMOLISHED MATERIALS

- A. Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.
 - 1. Do not allow demolished materials to accumulate on-site.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 - 3. Transport demolished materials off Owner's property and legally dispose of them.

END OF SECTION

DIVISION 16 - ELECTRICAL

SECTION 16050

BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section includes the following:
 - 1. Electrical equipment coordination and installation.
 - 2. Common electrical installation requirements.

1.03 DEFINITIONS

- A. ATS: Acceptance Testing Specifications.

1.04 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: The Contractor shall provide coordination drawings for each location requiring additional detail to properly plan, execute and document the work. Coordination drawings shall be drawn to scale.
 - 1. Examples of areas requiring additional detail include:
 - a. Areas in constrained spaces, where code required working space or free and clear panel door swings will be difficult to achieve.
 - b. Areas requiring coordination with installation work of other trades
 - c. Control and interconnecting wiring indicated below that deviates from the Contract drawings and is not provided by the equipment vendor, the System Integrator, or the Power System Integrator.
 - 2. Coordination Drawings shall consist of the following levels of detail:
 - a. Location of all conduit and conduit size

- b. Conductor size and number of wires inside conduit
 - c. Location of all pull and junction boxes
 - d. Location of all electrical equipment installed on the project.
 - e. Location of existing electrical equipment to be interfaced to items installed or modified under this Contract.
 - f. Verification that new equipment will not interfere with working clearance around existing equipment for operations and maintenance.
 - g. Modification details (both wiring and mechanical changes) to equipment to be modified under this project
 - h. Preparation of point to point wiring diagrams showing interconnecting wiring between new and existing equipment to be installed/modified under this project.
 - i. Preparation of point to point wiring diagrams showing interconnecting wiring between new and existing equipment to be installed/ modified under this project. Point to point wiring shall give a unique terminal block number for each device or conductor and its corresponding location.
3. Upon Completion of the project, a hardcopy "read-lined" sets of prints showing all work deviating from the Contract drawings or provided as part of the working drawing work shall be turned over to the ENGINEER for inspection and approval.
 4. Equipment Location Plants: Working drawings shall depict all of the wiring devices, conduits, field devices, and power distribution equipment on scaled plan drawings. Detail all proposed concealed and under slab raceways.
 5. Update Existing Panel Schedules
 - a. Provide an updated hardcopy of the panel schedule inside the existing panel.
 6. Provide working drawing of motor control schematics and interconnecting wiring for each new controlled motor.

1.05 QUALITY ASSURANCE

- A. Test Equipment Suitability and Calibration: Comply with NETA ATS, "Suitability of Test Equipment" and "Test Instrument Calibration."

1.06 FIELD CONDITIONS

- A. Coordinate arrangement, mounting, and support of electrical equipment:
 1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.

2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
 3. To allow right of way for piping and conduit installed at required slope.
 4. So connecting raceways, cables, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.
- B. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:
1. Notify Owner no fewer than five days in advance of proposed interruption of electric service.
 2. Do not proceed with interruption of electric service without Owner's written permission.
 3. The following outage limits have been established by the Owner. Submit a written mitigation plan for work activities that exceed the maximum duration(s) listed below.
 - a. 4 hours

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.
 2. Basis-of-Design Product: Products indicated are the design basis to develop equipment specifications and requirements. Substitutions may be made subject to compliance with the requirements.

PART 3 - EXECUTION

3.01 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

- A. Comply with NECA 1.
- B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.

- C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.
- D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.
- E. Right of Way: Give to raceways and piping systems installed at a required slope.

END OF SECTION

DIVISION 16 - ELECTRICAL
SECTION 16060
GROUNDING AND BONDING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section includes grounding and bonding systems and equipment.

1.03 ACTION SUBMITTALS

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

1.04 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Plans showing dimensioned locations of grounding features specified in "Field Quality Control" Article, including the following:
 - 1. Ground rods.
 - 2. Ground rings.
 - 3. Bonding to water pipes.
 - 4. Grounding arrangements and connections for separately derived systems.
- B. Qualification Data: For testing agency and testing agency's field supervisor.
- C. Field quality-control reports.

1.05 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For grounding to include in emergency, operation, and maintenance manuals.

1. In addition to items specified in Division 01 "Operation and Maintenance Data," include the following:
 - a. Plans showing as-built, dimensioned locations of system described in "Field Quality Control" Article, including the following:
 - 1) Ground rods.
 - 2) Ground rings.
 - 3) Bonding to water pipes.
 - 4) Grounding arrangements and connections for separately derived systems.

1.06 **QUALITY ASSURANCE**

- A. Testing Agency Qualifications: Certified by NETA.

PART 2 - PRODUCTS

2.01 **CONDUCTORS**

- A. Insulated Conductors: Copper or tinned-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 B3.
 2. Stranded Conductors: ASTM B8.
 3. Tinned Conductors: ASTM B33.

2.02 **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. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.
- C. Bus-Bar Connectors: Compression type, copper or copper alloy, with two wire terminals.
- D. Conduit Hubs: Mechanical type, terminal with threaded hub.
- E. Ground Rod Clamps: Mechanical type, copper or copper alloy, terminal with hex head bolt.

- F. Straps: Solid copper, cast-bronze clamp or copper lugs. Rated for 600 A.
- G. U-Bolt Clamps: Mechanical type, copper or copper alloy, terminal listed for direct burial.
- H. Water Pipe Clamps:
 - 1. U-bolt type with malleable-iron clamp and copper ground connector rated for direct burial.

2.03 **GROUNDING ELECTRODES**

- A. Ground Rods: Copper-clad steel; 3/4 inch by 10 feet.

PART 3 - EXECUTION

3.01 **APPLICATIONS**

- A. Conductors: Install solid conductor for No. 12 AWG and smaller, and stranded conductors for No. 10 AWG and larger unless otherwise indicated.
- B. Underground Grounding Conductors: Install bare copper conductor, No. 2/0 AWG minimum.
 - 1. Bury at least 30 inches below grade.
- C. Conductor Terminations and Connections:
 - 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
 - 2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
 - 3. Connections to Ground Rods at Test Wells: Bolted connectors.
 - 4. Connections to Structural Steel: Welded connectors.

3.02 **EQUIPMENT GROUNDING**

- A. Install insulated equipment grounding conductors with all feeders and branch circuits.

3.03 **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 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. Use exothermic welds for all below-grade connections.
 - 3. For grounding electrode system, install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.
- C. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.
 - 1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
 - 2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
 - 3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.
- D. Grounding and Bonding for Piping:
 - 1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange by using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.

3.04 **FIELD QUALITY CONTROL**

- A. 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, at ground test wells, and at individual ground rods. Make tests at ground rods before any conductors are connected.
 - a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
 - b. Perform tests by fall-of-potential method according to IEEE 81.
- 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 the following values:
1. Power and Lighting Equipment or System with Capacity of 500 kVA and Less: 10 ohms.
 2. Power Distribution Units or Panelboards Serving Electronic Equipment: 3 ohm(s).
 3. Substations and Pad-Mounted Equipment: 5 ohms.
 4. Manhole Grounds: 10 ohms.

END OF SECTION

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DIVISION 16 – ELECTRICAL

SECTION 16073

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:
 - 1. Steel slotted support systems.
 - 2. Conduit and cable support devices.
 - 3. Support for conductors in vertical conduit.
 - 4. Mounting, anchoring, and attachment components, including powder-actuated fasteners, mechanical expansion anchors, concrete inserts, clamps, through bolts, toggle bolts, and hanger rods.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:
 - a. Slotted support systems, hardware, and accessories.
 - b. Clamps.
 - c. Hangers.
 - d. Sockets.
 - e. Eye nuts.
 - f. Fasteners.
 - g. Anchors.
 - h. Saddles.
 - i. Brackets.
 - 2. Include rated capacities and furnished specialties and accessories.

- B. Shop Drawings: For fabrication and installation details for electrical hangers and support systems.
 - 1. Hangers. Include product data for components.
 - 2. Slotted support systems.
 - 3. Equipment supports.
 - 4. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.

1.04 INFORMATIONAL SUBMITTALS

- A. Welding certificates.

1.05 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M.
 - 2. AWS D1.2/D1.2M.

PART 2 - PRODUCTS

2.01 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems: Preformed steel channels and angles with minimum 13/32-inch diameter holes at a maximum of 8 inches o.c. in at least one surface.
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Cooper B-Line, Inc.; a division of Cooper Industries.
 - b. Thomas & Betts Corporation.
 - c. Unistrut; Tyco International, Ltd.
 - d. Approved equal.
 - 2. Standard: Comply with MFMA-4 factory-fabricated components for field assembly.
 - 3. Material for Channel, Fittings, and Accessories: Galvanized steel.
 - 4. Channel Width: Selected for applicable load criteria.
 - 5. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.

- B. Conduit and Cable Support Devices: Steel and malleable-iron hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- C. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for nonarmored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be made of malleable iron.
- D. Structural Steel for Fabricated Supports and Restraints: ASTM A36/A36M steel plates, shapes, and bars; black and galvanized.
- E. 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 where used.
 - a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) Cooper B-Line, Inc.; a division of Cooper Industries.
 - 2) Empire Tool and Manufacturing Co., Inc.
 - 3) Hilti Inc.
 - 4) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
 - 5) MKT Fastening, LLC.
 - 6) Approved Equal.
 - 2. Concrete Inserts: Steel or malleable-iron, slotted support system units are similar to MSS Type 18 units and comply with MFMA-4 or MSS SP-58.
 - 3. Clamps for Attachment to Steel Structural Elements: MSS SP-58 units are suitable for attached structural element.
 - 4. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM F3125/F3125M, Grade A325 (Grade A325M).
 - 5. Toggle Bolts: All-steel springhead type.
 - 6. Hanger Rods: Threaded steel.

PART 3 - EXECUTION

3.01 APPLICATION

- A. Comply with the following standards for application and installation requirements of hangers and supports, except where requirements on Drawings or in this Section are stricter:
 - 1. NECA 1
 - 2. NECA 101
- B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceways: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch in diameter.
- C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
 - 1. Secure raceways and cables to these supports with single-bolt conduit clamps.
- D. 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.

3.02 SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this article.
- B. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.
- C. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
 - 1. To Wood: Fasten with lag screws or through bolts.
 - 2. To New Concrete: Bolt to concrete inserts.
 - 3. To Existing Concrete: Expansion anchor fasteners.
- D. Drill holes for expansion anchors in concrete at locations and to depths that avoid the need for reinforcing bars.

END OF SECTION

DIVISION 16 – ELECTRICAL
SECTION 16075
ELECTRICAL IDENTIFICATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:
 - 1. Labels.
 - 2. Bands and tubes.
 - 3. Tapes and stencils.
 - 4. Tags.
 - 5. Signs.
 - 6. Cable ties.
 - 7. Miscellaneous identification products.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for electrical identification products.
- B. Identification Schedule: For each piece of electrical equipment and electrical system components to be an index of nomenclature for electrical equipment and system components used in identification signs and labels. Use same designations indicated on Drawings.

PART 2 - PRODUCTS

2.01 COLOR AND LEGEND REQUIREMENTS

- A. Raceways and Cables Carrying Circuits at 600 V or Less:
 - 1. Black letters on an orange field.
 - 2. Legend: Indicate voltage and system or service type.

- B. Color-Coding for Phase- and Voltage-Level Identification, 600 V or Less: Use colors listed below for ungrounded service, feeder, and branch-circuit conductors.
 - 1. Color shall be factory applied or field applied for sizes larger than No. 8 AWG if authorities having jurisdiction permit.
 - 2. Colors for 208/240/120-V Circuits:
 - a. Phase A: Black.
 - b. Phase B: Red.
 - c. Phase C: Blue.
 - 3. Colors for 240-V, single phase Circuits:
 - a. Phase A: Black.
 - b. Phase B: Red.
 - 4. Colors for 480/277-V Circuits:
 - a. Phase A: Brown.
 - b. Phase B: Orange.
 - c. Phase C: Yellow.
 - 5. Color for Neutral: White.
 - 6. Color for Equipment Grounds: Bare copper, Green, or Green with a yellow stripe.
 - 7. Colors for Isolated Grounds: Green with two or more yellow stripes.

- C. Warning Label Colors:
 - 1. Identify system voltage with black letters on an orange background.

- D. Warning labels and signs shall include, but are not limited to, the following legends:
 - 1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
 - 2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES."

- E. Equipment Identification Labels:

1. Black letters on a white field.

2.02 LABELS

- A. Vinyl Wraparound Labels: Preprinted, flexible labels laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing label ends.
- B. Snap-around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeves, with diameters sized to suit diameters and that stay in place by gripping action.
- C. Self-Adhesive Wraparound Labels: Preprinted, 3-mil thick, polyester flexible label with acrylic pressure-sensitive adhesive.
 1. Self-Lamination: Clear; UV-, weather- and chemical-resistant; self-laminating, protective shield over the legend. Labels sized such that the clear shield overlaps the entire printed legend.
 2. Marker for Labels:
 - a. Machine-printed, permanent, waterproof, black ink recommended by printer manufacturer.
- D. Self-Adhesive Labels: Polyester or vinyl, thermal, transfer-printed, 3-mil thick, multicolor, weather- and UV-resistant, pressure-sensitive adhesive labels, configured for intended use and location.
 1. Minimum Nominal Size:
 - a. 1-1/2 by 6 inches for raceway and conductors.
 - b. 3-1/2 by 5 inches for equipment.
 - c. As required by authorities having jurisdiction.

2.03 TAGS

- A. Nonmetallic Preprinted Tags: Polyethylene tags, 0.015 inch thick, color-coded for phase and voltage level, with factory printed permanent designations; punched for use with self-locking cable tie fastener.

2.04 SIGNS

- A. Laminated Acrylic or Melamine Plastic Signs:
 1. Engraved legend.
 2. Thickness:

- a. For signs up to 20 sq. in., minimum 1/16 inch thick.
- b. For signs larger than 20 sq. in., 1/8 inch thick.
- c. Engraved legend with black letters on white face.
- d. Punched or drilled for mechanical fasteners with 1/4-inch grommets in corners for mounting.
- e. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

2.05 CABLE TIES

- A. General-Purpose Cable Ties: Fungus inert, self-extinguishing, one piece, self-locking, and Type 6/6 nylon.
 - 1. Minimum Width: 3/16 inch.
 - 2. Tensile Strength at 73 Deg F according to ASTM D638: 12,000 psi.
 - 3. Temperature Range: Minus 40 to plus 185 deg F.
 - 4. Color: Black, except where used for color-coding.

2.06 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Retain paint system applicable for surface material and location (exterior or interior).
- B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Self-Adhesive Identification Products: Before applying electrical identification products, clean substrates of substances that could impair bond, using materials and methods recommended by manufacturer of identification product.

3.02 INSTALLATION

- A. Verify and coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and operation and maintenance manual. Use consistent designations throughout Project.
- B. Install identifying devices before installing acoustical ceilings and similar concealment.

- C. Verify identity of each item before installing identification products.
- D. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and operation and maintenance manual.
- E. Apply identification devices to surfaces that require finish after completing finish work.
- F. Install signs with approved legend to facilitate proper identification, operation, and maintenance of electrical systems and connected items.
- G. System Identification for Raceways and Cables under 600 V: Identification shall completely encircle cable or conduit. Place identification of two-color markings in contact, side by side.
 - 1. Secure tight to surface of conductor, cable, or raceway.
- H. System Identification for Raceways and Cables over 600 V: Identification shall completely encircle cable or conduit. Place adjacent identification of two-color markings in contact, side by side.
 - 1. Secure tight to surface of conductor, cable, or raceway.
- I. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.
- J. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background with minimum 3/8-inch high letters for emergency instructions at equipment used for power transfer or load shedding.
- K. Vinyl Wraparound Labels:
 - 1. Secure tight to surface of raceway or cable at a location with high visibility and accessibility.
 - 2. Attach labels that are not self-adhesive type with clear vinyl tape, with adhesive appropriate to the location and substrate.
- L. Snap-around Labels: Secure tight to surface at a location with high visibility and accessibility.
- M. Self-Adhesive Wraparound Labels: Secure tight to surface at a location with high visibility and accessibility.
- N. Self-Adhesive Labels:
 - 1. On each item, install unique designation label that is consistent with wiring diagrams, schedules, and operation and maintenance manual.

2. Unless otherwise indicated, provide a single line of text with 1/2-inch high letters on 1-1/2-inch high label; where two lines of text are required, use labels 2 inches high.
- O. Snap-around Color-Coding Bands: Secure tight to surface at a location with high visibility and accessibility.
- P. Marker Tapes: Secure tight to surface at a location with high visibility and accessibility.
- Q. Self-Adhesive Vinyl Tape: Secure tight to surface at a location with high visibility and accessibility.
1. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding.
- R. Underground Line Warning Tape:
1. During backfilling of trenches, install continuous underground-line warning tape directly above cable or raceway at 6 to 8 inches below finished grade. Use multiple tapes where width of multiple lines installed in a common trench exceeds 16 inches overall.
 2. Install underground-line warning tape for direct-buried cables and cables in raceways.
- S. Nonmetallic Preprinted Tags:
1. Place in a location with high visibility and accessibility.
 2. Secure using general-purpose cable ties.
- T. Cable Ties: General purpose, for attaching tags, except as listed below:
1. Outdoors: UV-stabilized nylon.

3.03 IDENTIFICATION SCHEDULE

- A. Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment. Install access doors or panels to provide view of identifying devices.
- B. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, pull points, and locations of high visibility. Identify by system and circuit designation.

- C. Accessible Raceways, Armored and Metal-Clad Cables, More Than 600 V: Vinyl wraparound labels, Snap-around labels, Self-adhesive labels, or Snap-around color-coding bands for raceway and cables.
 - 1. Locate identification at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.
- D. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits, More Than 30 A and 120 V to Ground: Identify with self-adhesive raceway labels or vinyl tape applied in bands.
 - 1. Locate identification at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.
- E. Accessible Fittings for Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive labels containing the wiring system legend and system voltage. System legends shall be as follows:
 - 1. "EMERGENCY POWER."
 - 2. "POWER."
- F. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use vinyl wraparound labels, self-adhesive wraparound labels, snap-around labels, snap-around color-coding bands, or self-adhesive vinyl tape to identify the phase.
 - 1. Locate identification at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.
- G. Control-Circuit Conductor Identification: For conductors and cables in pull and junction boxes, manholes, and handholes, use self-adhesive labels with the conductor or cable designation, origin, and destination.
- H. Control-Circuit Conductor Termination Identification: For identification at terminations, provide self-adhesive labels with the conductor designation.
- I. Locations of Underground Lines: Underground-line warning tape for power, lighting, communication, and control wiring and optical-fiber cable.
- J. Instructional Signs: Self-adhesive labels, including the color code for grounded and ungrounded conductors.
- K. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive labels.

1. Apply to exterior of door, cover, or other access.
 2. For equipment with multiple power or control sources, apply to door or cover of equipment, including, but not limited to, the following:
 - a. Power-transfer switches.
 - b. Controls with external control power connections.
- L. Arc Flash Warning Labeling: Self-adhesive labels.
- M. Operating Instruction Signs: Self-adhesive labels.
- N. Emergency Operating Instruction Signs: Self-adhesive labels with white legend on a red background with minimum 3/8-inch-high letters for emergency instructions at equipment used for power transfer or load shedding.
- O. Equipment Identification Labels:
1. Indoor Equipment: Self-adhesive label.
 2. Outdoor Equipment: Laminated acrylic or melamine sign.
 3. Equipment to Be Labeled:
 - a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be in the form of a self-adhesive, engraved, laminated acrylic or melamine label.
 - b. Enclosures and electrical cabinets.
 - c. Transformers: Label that includes tag designation indicated on Drawings for the transformer, feeder, and panelboards or equipment supplied by the secondary.
 - d. Emergency system boxes and enclosures.
 - e. Motor-control centers.
 - f. Enclosed switches.
 - g. Enclosed circuit breakers.
 - h. Enclosed controllers.
 - i. Variable-speed controllers.
 - j. Push-button stations.
 - k. Power-transfer equipment.
 - l. Remote-controlled switches, dimmer modules, and control devices.
 - m. Power-generating units.
 - n. Monitoring and control equipment.

END OF SECTION

DIVISION 16 – ELECTRICAL
SECTION 16120
CONDUCTORS AND CABLES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:
 - 1. Copper building wire rated 600 V or less.
 - 2. Aluminum building wire rated 600 V or less.
 - 3. Connectors, splices, and terminations rated 600 V and less.
- B. Related Requirements:
 - 1. Section 16123 "Control-Voltage Electrical Power Cables" for control systems communications cables and Classes 1, 2, and 3 control cables.

1.03 DEFINITIONS

- A. RoHS: Restriction of Hazardous Substances.
- B. VFC: Variable-frequency controller.

1.04 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Product Schedule: Indicate type, use, location, and termination locations.

1.05 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

PART 2 - PRODUCTS

2.01 COPPER BUILDING WIRE

- A. Description: Flexible, insulated and uninsulated, drawn copper current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V or less.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Okonite Company (The).
 - 2. General Cable Corporation.
 - 3. Southwire Company, LLC.
 - 4. Approved Equal.
- C. Standards:
 - 1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
 - 2. RoHS compliant.
 - 3. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."
- D. Conductors: Copper, complying with ASTM B3 for bare annealed copper and with ASTM B8 for stranded conductors.
- E. Conductor Insulation:
 - 1. Type TC-ER: Comply with NEMA WC 70/ICEA S-95-658 and UL 1277.
 - 2. Type THHN and Type THWN-2: Comply with UL 83.
 - 3. Type XHHW-2: Comply with UL 44.
- F. Shield:
 - 1. Type TC-ER: Cable designed for use with VFCs, with oversized crosslinked polyethylene insulation, spiral-wrapped foil plus 85 percent coverage braided shields and insulated full-size ground wire, and sunlight- and oil-resistant outer PVC jacket.

2.02 CONNECTORS AND SPLICES

- A. Description: Factory-fabricated connectors, splices, and lugs of size, ampacity rating, material, type, and class for application and service indicated; listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.

- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. O-Z/Gedney; brand of Emerson Electric Co., Automation Solutions, Appleton Group.
 - 2. Hubbell Utility Solutions; Hubbell Incorporated.
 - 3. 3M: Electrical Products Division.
 - 4. Approved Equal.
- C. Jacketed Cable Connectors: For steel and aluminum jacketed cables, zinc die-cast with set screws, designed to connect conductors specified in this Section.
- D. Lugs: One piece, seamless, designed to terminate conductors specified in this Section.
 - 1. Material: Copper or Aluminum.
 - 2. Type: Two hole with standard barrels.
 - 3. Termination: Compression.

PART 3 - EXECUTION

3.01 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders: Copper; solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- B. Branch Circuits: Copper. Solid for No. 12 AWG and smaller; stranded for No. 10 AWG and larger.

3.02 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Exposed Feeders: Type THHN/THWN-2, single conductors in raceway.

3.03 INSTALLATION OF CONDUCTORS AND CABLES

- A. 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.
- B. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

- C. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- D. Support cables according to Section 16073 "Hangers and Supports for Electrical Systems."

3.04 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.

3.05 IDENTIFICATION

- A. Identify and color-code conductors and cables according to Section 16075 "Electrical Identification."
- B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

3.06 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
 - 1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors for compliance with requirements.
 - 2. Perform each of the following visual and electrical tests:
 - a. Inspect exposed sections of conductor and cable for physical damage and correct connection according to the single-line diagram.
 - b. Test bolted connections for high resistance using one of the following:
 - 1) A low-resistance ohmmeter.
 - 2) Calibrated torque wrench.
 - c. Inspect compression-applied connectors for correct cable match and indentation.

- d. Inspect for correct identification.
 - e. Inspect cable jacket and condition.
 - f. Continuity test on each conductor and cable.
 - g. Uniform resistance of parallel conductors.
- B. Cables will be considered defective if they do not pass tests and inspections.
- C. Prepare test and inspection reports 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.

END OF SECTION

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DISVISION 16 - ELECTRICAL

SECTION 16123

CONTROL-VOLTAGE ELECTRICAL POWER CABLES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:
 - 1. Category 5e balanced twisted pair cable.
 - 2. Low-voltage control cabling.
 - 3. Control-circuit conductors.
 - 4. Identification products.

1.03 DEFINITIONS

- A. EMI: Electromagnetic interference.
- B. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control and signaling power-limited circuits.
- C. Plenum: A space forming part of the air distribution system to which one or more air ducts are connected. An air duct is a passageway, other than a plenum, for transporting air to or from heating, ventilating, or air-conditioning equipment.

1.04 ACTION SUBMITTALS

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

1.05 INFORMATIONAL SUBMITTALS

- A. Source quality-control reports.

- B. Field quality-control reports.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- 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. Flame Travel and Smoke Density in Plenums: As determined by testing identical products according to NFPA 262, by a qualified testing agency. Identify products for installation in plenums with appropriate markings of applicable testing agency.
 - 1. Flame Travel Distance: 60 inches or less.
 - 2. Peak Optical Smoke Density: 0.5 or less.
 - 3. Average Optical Smoke Density: 0.15 or less.
- C. Flame Travel and Smoke Density for Riser Cables in Non-Plenum Building Spaces: As determined by testing identical products according to UL 1666.
- D. Flame Travel and Smoke Density for Cables in Non-Riser Applications and Non-Plenum Building Spaces: As determined by testing identical products according to UL 1685.
- E. RoHS compliant.

2.02 CATEGORY 5e BALANCED TWISTED PAIR CABLE

- A. Description: Four-pair, balanced-twisted pair cable, certified to meet transmission characteristics of Category 5e cable at frequencies up to 100 MHz.
- B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Belden Inc.
 - 2. General Cable; Prysmian Group North America.
 - 3. Monoprice, Inc.
 - 4. Approved Equal.
- C. Standard: Comply with ICEA S-90-661, NEMA WC 63.1, and TIA-568-C.2 for Category 5e cables.
- D. Conductors: 100-ohm, 24 AWG solid copper.

- E. Shielding/Screening: Unshielded twisted pairs (UTP).
- F. Cable Rating: Riser.
- G. Jacket: Blue thermoplastic.

2.03 LOW-VOLTAGE CONTROL CABLE

- A. Description: Shielded Twisted Pair (STP) cables shall be used for all analog signal wiring installed under this contract.
- B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. Belden Electronic Wire and Cable Company.
 - 2. General Cable; Prysmian Group North America.
 - 3. Okonite Company.
 - 4. Approved Equal.
- C. Paired Cable: NFPA 70, Type CMG.
 - 1. One pair, twisted, No. 16 AWG, stranded (19x29) tinned-copper conductors.
 - 2. PVC insulation, 600 V.
 - 3. Cable shield shall be aluminum-polyester tape overlapped to provide 100% coverage, and a 7 strand tinned copper drain wire, size 18 AWG.
 - 4. PVC jacket, 80 C temperature rating.
 - 5. Flame Resistance: Comply with UL 1685.

2.04 CONTROL-CIRCUIT CONDUCTORS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. General Cable; Prysmian Group North America.
 - 2. Service Wire Co.
 - 3. Southwire Company.
 - 4. Approved Equal.
- B. Class 1 Control Circuits: Stranded copper, Type THHN/THWN-2, complying with UL 83 in raceway Type XHHW-2, complying with UL 44 in raceway.
- C. Class 2 Control Circuits: Stranded copper, Type THHN/THWN-2, complying with UL 83 in raceway Type XHHW-2, complying with UL 44 in raceway.

- D. Class 3 Remote-Control and Signal Circuits: Stranded copper, Type THHN/THWN-2, complying with UL 83 in raceway Type XHHW-2, complying with UL 44 in raceway.

2.05 SOURCE QUALITY CONTROL

- A. Factory test twisted pair cables according to TIA-568-C.2.
- B. Cable will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Test cables on receipt at Project site.
 - 1. Test each pair of twisted pair cable for open and short circuits.
 - 2. Reject failed cables.

3.02 INSTALLATION OF RACEWAYS AND BOXES

- A. Comply with requirements in Section 16130 "Raceways and Boxes" for raceway selection and installation requirements for boxes, conduits, and wireways as supplemented or modified in this Section.
 - 1. Outlet boxes shall be no smaller than 2 inches wide, 3 inches high, and 2-1/2 inches deep.
 - 2. Outlet boxes for cables shall be no smaller than 4 inches square by 2-1/8 inches deep with extension ring sized to bring edge of ring to within 1/8 inch of the finished wall surface.
 - 3. Flexible metal conduit shall not be used.
- B. Comply with TIA-569-D for pull-box sizing and length of conduit and number of bends between pull points.
- C. Install manufactured conduit sweeps and long-radius elbows if possible.

3.03 INSTALLATION OF CONDUCTORS AND CABLES

- A. Comply with NECA 1.
- B. General Requirements for Cabling:

1. Comply with TIA-568-C Series of standards.
2. Comply with BICSI ITSIMM, Ch. 5, "Copper Structured Cabling Systems."
3. Cables may not be spliced and shall be continuous from terminal to terminal. Do not splice cable between termination, tap, or junction points. Make taps, and terminations only at indicated outlets, terminals, and cross-connect and patch panels.
4. Cables serving a common system may be grouped in a common raceway. Install network cabling and control wiring and cable in separate raceway from power wiring. Do not group conductors from different systems or different voltages.
5. Furnish a separate raceway system for shielded signal cable. Do not run in the same conduit with power cable.
6. Where telemetry cables are run in the same duct bank with power cables, use galvanized steel conduit. Use junction boxes and "LB" fittings in manholes to maintain a continuous steel raceway system for signal cables.
7. Do not install bruised, kinked, scored, deformed, or abraded cable. Remove and discard cable if damaged during installation and replace it with new cable.
8. Cold-Weather Installation: Bring cable to room temperature before dereeling. Do not use heat lamps for heating.
9. Pulling Cable: Comply with BICSI ITSIMM, Ch. 5, "Copper Structured Cabling Systems." Monitor cable pull tensions.
10. Secure: Fasten securely in place with hardware specifically designed and installed so as to not damage cables.
11. Provide strain relief.
12. Keep runs short. Allow extra length for connecting to terminals. Do not bend cables in a radius less than 10 times the cable OD. Use sleeves or grommets to protect cables from vibration at points where they pass around sharp corners and through penetrations.
13. Ground wire shall be copper, and grounding methods shall comply with IEEE C2. Demonstrate ground resistance.

C. Installation of Control-Circuit Conductors:

1. Install wiring in raceways.
2. Use insulated spade lugs for wire and cable connection to screw terminals.
3. Comply with requirements specified in Section 16130 "Raceways and Boxes."
4. Control wiring may be pulled in the power conduits and wireways providing the highest voltage of the adjacent wires is not more than 120 volts.

D. Power Control Systems

1. The wiring of this category (single conductor, or multiple conductor) is to be installed in accordance with the NEC.

E. Telemetry and Instrumentation Signal Systems

1. Separate conduit and wireway runs are required for this category. All wiring is to be isolated from all power systems.

F. Separation from EMI Sources:

1. Comply with BICSI TDMM and TIA-569-D recommendations for separating unshielded copper voice and data communications cable from potential EMI sources including electrical power lines and equipment.
2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:
 - a. Electrical Equipment or Circuit Rating Less Than 2 kVA: A minimum of 5 inches.
 - b. Electrical Equipment or Circuit Rating between 2 and 5 kVA: A minimum of 12 inches.
 - c. Electrical Equipment or Circuit Rating More Than 5 kVA: A minimum of 24 inches.
3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:
 - a. Electrical Equipment or Circuit Rating Less Than 2 kVA: A minimum of 2-1/2 inches.
4. Separation between communications cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:
 - a. Electrical Equipment or Circuit Rating Less Than 2 kVA: No requirement.
 - b. Electrical Equipment or Circuit Rating between 2 and 5 kVA: A minimum of 3 inches.
 - c. Electrical Equipment or Circuit Rating More Than 5 kVA: A minimum of 6 inches.
5. Separation between Communications Cables and Electrical Motors and Transformers, 5 kVA or 5 HP and Larger: A minimum of 48 inches.
6. Separation between Communications Cables and Fluorescent Fixtures: A minimum of 5 inches.

3.04 REMOVAL OF CONDUCTORS AND CABLES

- A. Remove abandoned conductors and cables. Abandoned conductors and cables are those installed that are not terminated at equipment and are not identified with a tag for future use.

3.05 CONTROL-CIRCUIT CONDUCTORS

- A. Minimum Conductor Sizes:
 1. Class 1 remote-control and signal circuits; No 14 AWG.
 2. Class 2 low-energy, remote-control, and signal circuits; No. 16 AWG.
 3. Class 3 low-energy, remote-control, alarm, and signal circuits; No 12 AWG.

3.06 GROUNDING

- A. For data communication wiring, comply with TIA-607-B and with BICSI TDMM, "Bonding and Grounding (Earthing)" Chapter.

3.07 IDENTIFICATION

- A. Comply with requirements for identification specified in Section 16075 "Electrical Identification."
- B. Identify data and communications system components, wiring, and cabling according to TIA-606-B; label printers shall use label stocks, laminating adhesives, and inks complying with UL 969.

3.08 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. General Tests and Inspections:
 1. Visually inspect cable jacket materials for UL or third-party certification markings. Inspect cabling terminations to confirm color-coding for pin assignments, and inspect cabling connections to confirm compliance with TIA-568-C.1.
 2. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
 3. Test cabling for direct-current loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination, but not after cross-connection.

- a. Test instruments shall meet or exceed applicable requirements in TIA-568-C.2. Perform tests with a tester that complies with performance requirements in its "Test Instruments (Normative)" Annex, complying with measurement accuracy specified in its "Measurement Accuracy (Informative)" Annex. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
- C. Retest and inspect cabling to determine compliance of replaced or additional work with specified requirements.
- D. Document data for each measurement. Print data for submittals in a summary report that is formatted using Table 10.1 in BICSI TDMM as a guide, or transfer the data from the instrument to the computer, save as text files, print, and submit.
- E. End-to-end cabling will be considered defective if it does not pass tests and inspections.
 - 1. Remove and replace cabling where test results indicate that they do not comply with specified requirements. Retest until satisfactory.
- F. Prepare test and inspection reports.

END OF SECTION

DIVISION 16 - ELECTRICAL

SECTION 16130

RACEWAYS AND BOXES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:
 - 1. Metal conduits and fittings.
 - 2. Nonmetallic conduits and fittings.
 - 3. Metal wireways and auxiliary gutters.
 - 4. Boxes, enclosures, and cabinets.
 - 5. Handholes and boxes for exterior underground cabling.

1.03 DEFINITIONS

- A. ARC: Aluminum rigid conduit.
- B. GRC: Galvanized rigid steel conduit.
- C. LFMC: Liquidtight flexible metal conduit.

1.04 ACTION SUBMITTALS

- A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

PART 2 - PRODUCTS

2.01 METAL CONDUITS AND FITTINGS

A. Metal Conduit:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Allied Tube & Conduit; a Tyco International Ltd. Co.
 - b. Anamet Electrical, Inc.; Anaconda Metal Hose.
 - c. O-Z Gedney; a unit of General Signal.
 - d. Wheatland Tube Company.
 - e. Approved equal.
2. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
3. GRC: Comply with ANSI C80.1 and UL 6.
4. ARC: Comply with ANSI C80.5 and UL 6A.
5. EMT: Comply with ANSI C80.3 and UL 797.
6. FMC: Comply with UL 1; zinc-coated steel.
7. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.

B. Metal Fittings:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Allied Tube & Conduit; a Tyco International Ltd. Co.
 - b. Anamet Electrical, Inc.; Anaconda Metal Hose.
 - c. O-Z Gedney; a unit of General Signal.
 - d. Wheatland Tube Company.
 - e. Approved equal.
2. Comply with NEMA FB 1 and UL 514B.
3. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
4. Fittings, General: Listed and labeled for type of conduit, location, and use.
5. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 1203 and NFPA 70.
6. Fittings for EMT:
 - a. Material: Steel or die cast.
 - b. Type: Setscrew or compression.
7. 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.
8. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch, with overlapping sleeves protecting threaded joints.

- C. Joint Compound for GRC or ARC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.02 NONMETALLIC CONDUITS AND FITTINGS

A. Nonmetallic Conduit:

- 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. AFC Cable Systems, Inc.
 - b. CANTEX Inc.
 - c. RACO; a Hubbell Company.
 - d. Thomas & Betts Corporation
 - e. Approved equal.
- 2. Listing and Labeling: Nonmetallic conduit shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- 3. RNC: Type EPC-40-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.

B. Nonmetallic Fittings:

- 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. AFC Cable Systems, Inc.
 - b. CANTEX Inc.
 - c. RACO; a Hubbell Company.
 - d. Thomas & Betts Corporation
 - e. Approved equal.
- 2. Fittings, General: Listed and labeled for type of conduit, location, and use.
- 3. Fittings for ENT and RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.
- 4. Solvents and Adhesives: As recommended by conduit manufacturer.

2.03 METAL WIREWAYS AND AUXILIARY GUTTERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Cooper B-Line, Inc.
 - 2. Hoffman.
 - 3. Square D; Schneider Electric.
 - 4. Approved equal.
- B. Description: Sheet metal, complying with UL 870 and NEMA 250, Type 1 unless otherwise indicated, and sized according to NFPA 70.
 - 1. Metal wireways installed outdoors shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.
- D. Wireway Covers: Hinged type unless otherwise indicated.
- E. Finish: Manufacturer's standard enamel finish.

2.04 BOXES, ENCLOSURES, AND CABINETS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Cooper Crouse-Hinds; Div. of Cooper Industries, Inc.
 - 2. Hoffman.
 - 3. Hubbell Incorporated; Killark Electric Manufacturing Co. Division.
 - 4. Thomas & Betts Corporation..
 - 5. Approved equal.
- B. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.
- C. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.
- D. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, aluminum, Type FD, with gasketed cover.

1. Provide PVC-Coated pull and junction boxes on PVC-Coated conduit runs. PVC coated boxes shall be supplied by the same manufacturer as the PVC-Coated conduit
- E. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.
- F. Box extensions used to accommodate new building finishes shall be of same material as recessed box.
- G. Gangable boxes are prohibited.
- H. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 1 with continuous-hinge cover with flush latch unless otherwise indicated.
1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
 2. Nonmetallic Enclosures: UV resistant Plastic or Fiberglass.
 3. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.
- I. Cabinets:
1. NEMA 250, Type 1 galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
 2. Hinged door in front cover with flush latch and concealed hinge.
 3. Key latch to match panelboards.
 4. Metal barriers to separate wiring of different systems and voltage.
 5. Accessory feet where required for freestanding equipment.
 6. Nonmetallic cabinets shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

PART 3 - EXECUTION

3.01 RACEWAY APPLICATION

- A. Outdoors: Apply raceway products as specified below unless otherwise indicated:
1. Exposed Conduit: GRC.
 2. Underground Conduit, Direct Buried: PVC-coated rigid steel conduit.
 3. Underground Conduit, Concrete Encased: RNC.
- B. Indoors: Apply raceway products as specified below unless otherwise indicated:

1. Exposed Dry Locations, Not Subject to Physical Damage: RNC, GRC or ARC.
 2. Exposed Dry Locations and Subject to Physical Damage: GRC or ARC.
 3. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
 4. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4X, 316 stainless steel in damp or wet locations.
- C. Minimum Raceway Size:
1. Direct buried: 1-inch trade size.
 2. Concrete encased ductbank: 2-inch trade size.
 3. All other applications: 3/4-inch trade size.
- D. Raceway Fittings: Compatible with raceways and suitable for use and location.
1. Rigid Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
 2. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.
- E. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.
- F. Install surface raceways only where indicated on Drawings.
- G. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F.

3.02 INSTALLATION

- A. Comply with requirements in Section 16073 "Hangers and Supports for Electrical Systems" for hangers and supports.
- B. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.
- C. Do not install raceways or electrical items on any "explosion-relief" walls or rotating equipment.
- D. Do not fasten conduits onto the bottom side of a metal deck roof.

- E. 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.
- F. Complete raceway installation before starting conductor installation.
- G. Arrange stub-ups so curved portions of bends are not visible above finished slab.
- H. 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.
- I. Make bends in raceway using large-radius preformed ells. Field bending shall be according to NFPA 70 minimum radii requirements. Use only equipment specifically designed for material and size involved.
- J. Conceal conduit within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
- K. Support conduit within 12 inches of enclosures to which attached.
- L. Raceways for Communications Cable: Install raceways, metallic and nonmetallic, rigid and flexible, as follows:
 - 1. 3/4-Inch Trade Size and Smaller: Install raceways in maximum lengths of 50 feet.
 - 2. 1-Inch Trade Size and Larger: Install raceways in maximum lengths of 75 feet.
 - 3. Install with a maximum of two 90-degree bends or equivalent for each length of raceway unless Drawings show stricter requirements. Separate lengths with pull or junction boxes or terminations at distribution frames or cabinets where necessary to comply with these requirements.
- M. 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.
- N. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.
- O. 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.
- P. 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.

- Q. Set metal floor boxes level and flush with finished floor surface.
- R. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

3.03 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 Division 02 Section "Earthwork" for pipe less than 6 inches in nominal diameter.
 - 2. Install backfill as specified in Division 02 Section "Earthwork."
 - 3. 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.
 - 4. Underground Warning Tape: Comply with requirements in Section 16075 "Electrical Identification."

3.04 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.
- D. Install handholes with bottom below frost line.
- E. Install removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, as required for installation and support of cables and conductors and as indicated. Select arm lengths to be long enough to provide

spare space for future cables but short enough to preserve adequate working clearances in enclosure.

- F. Field-cut openings for conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.

3.05 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

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DIVISION 16 - ELECTRICAL

SECTION 16269

VARIABLE-FREQUENCY MOTOR CONTROLLERS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section includes separately enclosed, preassembled, combination VFCs, rated 600 V and less, for speed control of three-phase, squirrel-cage induction motors.

1.03 DEFINITIONS

- A. CE: Conformance Europeene (European Compliance).
- B. CPT: Control power transformer.
- C. EMI: Electromagnetic interference.
- D. LED: Light-emitting diode.
- E. NC: Normally closed.
- F. NO: Normally open.
- G. OCPD: Overcurrent protective device.
- H. RFI: Radio-frequency interference.
- I. VFC: Variable-frequency motor controller.

1.04 ACTION SUBMITTALS

- A. Product Data: For each type and rating of VFC indicated.

1. Include dimensions and finishes for VFCs.
2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings: For each VFC indicated.

1. Include mounting and attachment details.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include heating and cooling calculations for enclosed VFDs.
4. Include diagrams for power, signal, and control wiring.

1.05 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Product Certificates: For each VFC from manufacturer.
- C. Harmonic Analysis Report: Provide Project-specific calculations and manufacturer's statement of compliance with IEEE 519.
- D. Source quality-control reports.
- E. Field quality-control reports.
- F. Sample Warranty: For special warranty.

1.06 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For VFCs to include in emergency, operation, and maintenance manuals.
 1. In addition to items specified in Division 01 include the following:
 - a. Manufacturer's written instructions for testing and adjusting thermal-magnetic circuit breaker and motor-circuit protector trip settings.
 - b. Manufacturer's written instructions for setting field-adjustable overload relays.
 - c. Manufacturer's written instructions for testing, adjusting, and reprogramming microprocessor control modules.
 - d. Manufacturer's written instructions for setting field-adjustable timers, controls, and status and alarm points.
 - e. Load-Current and Overload-Relay Heater List: Compile after motors have been installed, and arrange to demonstrate that selection of heaters suits actual motor nameplate, full-load currents.

- f. Load-Current and List of Settings of Adjustable Overload Relays: Compile after motors have been installed, and arrange to demonstrate that switch settings for motor-running overload protection suit actual motors to be protected.

1.07 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Accredited by NETA.
 - 1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. If stored in space that is not permanently enclosed and air conditioned, remove loose packing and flammable materials from inside controllers and install temporary electric heating, with at least 250 W per controller.
- B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for VFCs, including clearances between VFCs, and adjacent surfaces and other items.

1.09 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace VFCs that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - 1. Schneider Electric USA, Inc.
 - 2. ABB, Electrification Business.
 - 3. Eaton.
 - 4. Rockwell Automation, Inc.
 - 5. Approved Equal.

2.02 SYSTEM DESCRIPTION

- A. General Requirements for VFCs:
 - 1. VFCs and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 - 2. Comply with NEMA ICS 7, NEMA ICS 61800-2, and UL 508C.
- B. Application: variable torque.
- C. VFC Description: Variable-frequency motor controller, consisting of power converter that employs pulse-width-modulated inverter, factory built and tested in an enclosure, with integral disconnecting means and overcurrent and overload protection; listed and labeled by an NRTL as a complete unit; arranged to provide self-protection, protection, and variable-speed control of one or more three-phase induction motors by adjusting output voltage and frequency.
 - 1. Listed and labeled for integrated short-circuit current (withstand) rating by an NRTL acceptable to authorities having jurisdiction.
- D. Design and Rating: Match load type, such as fans, blowers, and pumps; and type of connection used between motor and load such as direct or through a power-transmission connection.
- E. Output Rating: Three phase; 10 to 60 Hz, with voltage proportional to frequency throughout voltage range; maximum voltage equals input voltage.
- F. Unit Operating Requirements:
 - 1. Input AC Voltage Tolerance: Plus 10 and minus 15 percent of VFC input voltage rating.
 - 2. Input AC Voltage Unbalance: Not exceeding 5 percent.
 - 3. Input Frequency Tolerance: Plus or minus 3 percent of VFC frequency rating.
 - 4. Minimum Efficiency: 96 percent at 60 Hz, full load.
 - 5. Minimum Displacement Primary-Side Power Factor: 96 percent under any load or speed condition.
 - 6. Minimum Short-Circuit Current (Withstand) Rating: 10 kA.
 - 7. Ambient Temperature Rating: Not less than 32 deg F and not exceeding 104 deg F.
 - 8. Humidity Rating: Less than 95 percent (noncondensing).
 - 9. Vibration Withstand: Comply with NEMA ICS 61800-2.
 - 10. Overload Capability: 1.1 times the base load current for 60 seconds; minimum of 1.8 times the base load current for three seconds.
- G. Inverter Logic: Microprocessor based, 32 bit, isolated from all power circuits.
- H. Isolated Control Interface: Allows VFCs to follow remote-control signal over a minimum 40:1 speed range.

1. Signal: Electrical.
- I. Internal Adjustability Capabilities:
 1. Minimum Speed: 5 to 25 percent of maximum rpm.
 2. Maximum Speed: 80 to 100 percent of maximum rpm.
 3. Acceleration: 0.1 to 999.9 seconds.
 4. Deceleration: 0.1 to 999.9 seconds.
 5. Current Limit: 30 to minimum of 150 percent of maximum rating.
 - J. Self-Protection and Reliability Features:
 1. Surge Suppression: Factory installed as an integral part of the VFC, complying with UL 1449 SPD, Type 1 or Type 2.
 2. Loss of Input Signal Protection: Selectable response strategy, including speed default to a percent of the most recent speed, a preset speed, or stop; with alarm.
 3. Under- and overvoltage trips.
 4. Inverter overcurrent trips.
 5. VFC and Motor-Overload/Overtemperature Protection: Microprocessor-based thermal protection system for monitoring VFCs and motor thermal characteristics, and for providing VFC overtemperature and motor-overload alarm and trip; settings selectable via the keypad.
 6. Critical frequency rejection, with three selectable, adjustable deadbands.
 7. Instantaneous line-to-line and line-to-ground overcurrent trips.
 8. Loss-of-phase protection.
 9. Reverse-phase protection.
 10. Short-circuit protection.
 11. Motor-temperature fault.
 - K. Power-Interruption Protection: To prevent motor from re-energizing after a power interruption until motor has stopped, unless "Bidirectional Autospeed Search" feature is available and engaged.
 - L. Bidirectional Autospeed Search: Capable of starting VFC into rotating loads spinning in either direction and returning motor to set speed in proper direction, without causing damage to drive, motor, or load.
 - M. Torque Boost: Automatically varies starting and continuous torque to at least 1.5 times the minimum torque to ensure high-starting torque and increased torque at slow speeds.
 - N. Motor Temperature Compensation at Slow Speeds: Adjustable current fall-back based on output frequency for temperature protection of self-cooled, fan-ventilated motors at slow speeds.
 - O. Integral Input Disconnecting Means and OCPD: UL 489, thermal-magnetic circuit breaker with pad-lockable, door-mounted handle mechanism.

1. Disconnect Rating: Not less than 115 percent of VFC input current rating.
2. Disconnect Rating: Not less than 115 percent of NFPA 70 motor full-load current rating or VFC input current rating, whichever is larger.
3. Auxiliary Contacts: NO or NC, arranged to activate before switch blades open.
4. Auxiliary contacts "a" and "b" arranged to activate with circuit-breaker handle.
5. NC alarm contact that operates only when circuit breaker has tripped.

2.03 CONTROLS AND INDICATION

- A. Status Lights: Door-mounted LED indicators displaying the following conditions:
1. Power on.
 2. Run.
 3. Overvoltage.
 4. Line fault.
 5. Overcurrent.
 6. External fault.
- B. Panel-Mounted Operator Station: Manufacturer's standard front-accessible, sealed keypad and plain-English-language digital display; allows complete programming, program copying, operating, monitoring, and diagnostic capability.
1. Keypad: In addition to required programming and control keys, include keys for HAND, OFF, and AUTO modes.
 2. Security Access: Provide electronic security access to controls through identification and password with at least three levels of access: View only; view and operate; and view, operate, and service.
 - a. Control Authority: Supports at least four conditions: Off, local manual control at VFC, local automatic control at VFC, and automatic control through a remote source.
- C. Historical Logging Information and Displays:
1. Real-time clock with current time and date.
 2. Running log of total power versus time.
 3. Total run time.
 4. Fault log, maintaining last four faults with time and date stamp for each.
- D. Indicating Devices: Digital display mounted flush in VFC door and connected to display VFC parameters including, but not limited to:
1. Output frequency (Hz).
 2. Motor speed (rpm).
 3. Motor status (running, stop, fault).

4. Motor current (amperes).
5. Motor torque (percent).
6. Fault or alarming status (code).
7. PID feedback signal (percent).
8. DC-link voltage (V dc).
9. Set point frequency (Hz).
10. Motor output voltage (V ac).

E. Control Signal Interfaces:

1. Electric Input Signal Interface:
 - a. A minimum of two programmable analog inputs: 4- to 20-mA dc.
 - b. A minimum of six multifunction programmable digital inputs.
2. Remote Signal Inputs: Capability to accept any of the following speed-setting input signals from the control systems:
 - a. 0- to 10-V dc.
 - b. 4- to 20-mA dc.
 - c. Potentiometer using up/down digital inputs.
 - d. Fixed frequencies using digital inputs.
3. Output Signal Interface: A minimum of one programmable analog output signal(s) (4- to 20-mA dc), which can be configured for any of the following:
 - a. Output frequency (Hz).
 - b. Output current (load).
 - c. Motor torque (percent).
 - d. Motor speed (rpm).
 - e. Set point frequency (Hz).
4. Remote Indication Interface: A minimum of three programmable dry-circuit relay outputs (120-V ac, 1 A) for remote indication of the following:
 - a. Motor running.
 - b. Set point speed reached.
 - c. Fault and warning indication (overtemperature or overcurrent).

2.04 LINE CONDITIONING AND FILTERING

- A. Input Line Conditioning: Based on the manufacturer's harmonic analysis study and report, provide input filtering, as required, to limit total demand (harmonic current) distortion and total harmonic voltage demand at the defined point of common coupling to meet IEEE 519 recommendations.

- B. EMI/RFI Filtering: CE marked; certify compliance with IEC 61800-3 for Category C2.

2.05 ENCLOSURES

- A. VFC Enclosures: NEMA 250, to comply with environmental conditions at installed location.
 - 1. Dry and Clean Indoor Locations: Type 1.
 - 2. Outdoor Locations: Type 4X.
 - 3. Wash-Down Areas: Type 4X, stainless steel.
 - 4. Other Wet or Damp Indoor Locations: Type 4.
 - 5. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: Type 12.

2.06 ACCESSORIES

- A. General Requirements for Control-Circuit and Pilot Devices: NEMA ICS 5; factory installed in VFC enclosure cover unless otherwise indicated.
 - 1. Push Buttons: Covered.
 - 2. Pilot Lights: Push to test.
 - 3. Selector Switches: Rotary type.
 - 4. Stop and Lockout Push-Button Station: Momentary-break, push-button station with a factory-applied hasp arranged so padlock can be used to lock push button in depressed position with control circuit open.
- B. Reversible NC/NO bypass contactor auxiliary contact(s).
- C. Control Relays: Auxiliary and adjustable solid-state time-delay relays.
- D. Phase-Failure, Phase-Reversal, and Undervoltage and Overvoltage Relays: Solid-state sensing circuit with isolated output contacts for hard-wired connections. Provide adjustable undervoltage, overvoltage, and time-delay settings.
 - 1. Current Transformers: Continuous current rating, basic impulse insulating level (BIL) rating, burden, and accuracy class suitable for connected circuitry. Comply with IEEE C57.13.
- E. Supplemental Digital Meters:
 - 1. Elapsed-time meter.
- F. Space heaters, with NC auxiliary contacts, to mitigate condensation in NEMA 250, Type 4X enclosures installed outdoors or in unconditioned interior spaces subject to humidity and temperature swings.

- G. Cooling Fan and Exhaust System: For NEMA 250, Type 1; UL 508 component recognized: Supply fan, with stainless-steel intake and exhaust grills and filters; 120-V ac; obtained from integral CPT.
- H. Maintain temperature control through use of air conditioner unit sized appropriately for the enclosure.
- I. Sun shields installed on fronts, sides, and tops of enclosures installed outdoors and subject to direct and extended sun exposure.
- J. Spare control-wiring terminal blocks; wired.

2.07 SOURCE QUALITY CONTROL

- A. Testing: Test and inspect VFCs according to requirements in NEMA ICS 61800-2.
 - 1. Test each VFC while connected to a motor that is comparable to that for which the VFC is rated.
 - 2. Verification of Performance: Rate VFCs according to operation of functions and features specified.
- B. VFCs will be considered defective if they do not pass tests and inspections.
- C. Prepare test and inspection reports.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine areas, surfaces, and substrates to receive VFCs, with Installer present, for compliance with requirements for installation tolerances, and other conditions affecting performance of the Work.
- B. Examine VFC before installation. Reject VFCs that are wet, moisture damaged, or mold damaged.
- C. Examine roughing-in for conduit systems to verify actual locations of conduit connections before VFC installation.
- D. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Wall-Mounting Controllers: Install with tops at uniform height and with disconnect operating handles not higher than 79 inches above finished floor, unless otherwise indicated, and by bolting units to wall or mounting on lightweight structural-steel channels bolted to wall. For controllers not on walls, provide freestanding racks complying with Section 16073 "Hangers and Supports for Electrical Systems."
- B. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.
- C. Install heaters in thermal-overload relays. Select heaters based on actual nameplate full-load amperes after motors are installed.
- D. Install, connect, and fuse thermal-protector monitoring relays furnished with motor-driven equipment.
- E. Comply with NECA 1.

3.03 CONTROL WIRING INSTALLATION

- A. Install wiring between VFCs and remote devices. Comply with requirements in Section 16123 "Control-Voltage Electrical Power Cables."
- B. Bundle, train, and support wiring in enclosures.
- C. Connect selector switches and other automatic-control devices where applicable.
 - 1. Connect selector switches to bypass only those manual- and automatic-control devices that have no safety functions when switches are in manual-control position.
 - 2. Connect selector switches with control circuit in both manual and automatic positions for safety-type control devices such as low- and high-pressure cutouts, high-temperature cutouts, and motor-overload protectors.

3.04 IDENTIFICATION

- A. Identify VFCs, components, and control wiring. Comply with requirements for identification specified in Section 16075 "Electrical Identification."
 - 1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
 - 2. Label each VFC with engraved nameplate.

3. Label each enclosure-mounted control and pilot device.

3.05 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Acceptance Testing Preparation:
 1. Test insulation resistance for each VFC element, bus, component, connecting supply, feeder, and control circuit.
 2. Test continuity of each circuit.
- C. Tests and Inspections:
 1. Inspect VFC, wiring, components, connections, and equipment installation. Test and adjust controllers, components, and equipment.
 2. Test insulation resistance for each VFC element, component, connecting motor supply, feeder, and control circuits.
 3. Test continuity of each circuit.
 4. Verify that voltages at VFC locations are within 10 percent of motor nameplate rated voltages. If outside this range for any motor, notify Construction Manager before starting the motor(s).
 5. Test each motor for proper phase rotation.
 6. Perform tests according to the Inspection and Test Procedures for Adjustable Speed Drives stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 7. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
 8. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.
- D. VFCs will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports, including a certified report that identifies the VFC and describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations made after remedial action.

3.06 STARTUP SERVICE

- A. Perform startup service.
 1. Complete installation and startup checks according to manufacturer's written instructions.

3.07 ADJUSTING

- A. Program microprocessors for required operational sequences, status indications, alarms, event recording, and display features. Clear events memory after final acceptance testing and prior to Substantial Completion.
- B. Set field-adjustable switches, auxiliary relays, time-delay relays, timers, and overload-relay pickup and trip ranges.

3.08 PROTECTION

- A. Temporary Heating: Apply temporary heat to maintain temperature according to manufacturer's written instructions until controllers are ready to be energized and placed into service.
- B. Replace VFCs whose interiors have been exposed to water or other liquids prior to Substantial Completion.

3.09 DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate, reprogram, and maintain VFCs.

END OF SECTION

DIVISION 16 - ELECTRICAL

SECTION 16410

ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:
 - 1. Molded-case circuit breakers (MCCBs).
 - 2. Enclosures.

1.03 DEFINITIONS

- A. NC: Normally closed.
- B. NO: Normally open.
- C. SPDT: Single pole, double throw.

1.04 ACTION SUBMITTALS

- A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include nameplate ratings, dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.
 - 1. Enclosure types and details for types other than NEMA 250, Type 1.
 - 2. Current and voltage ratings.
 - 3. Short-circuit current ratings (interrupting and withstand, as appropriate).
 - 4. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices, accessories, and auxiliary components.

5. Include time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device. Provide in PDF electronic format.

1.05 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

1.06 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For enclosed switches and circuit breakers to include in emergency, operation, and maintenance manuals.
 1. Include the following:
 - a. Manufacturer's written instructions for testing and adjusting enclosed switches and circuit breakers.
 - b. Time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device. Provide in PDF electronic format.

1.07 WARRANTY

- A. Manufacturer's Warranty: Manufacturer and Installer agree to repair or replace components that fail in materials or workmanship within specified warranty period.

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Source Limitations: Obtain enclosed switches and circuit breakers, overcurrent protective devices, components, and accessories, within same product category, from single manufacturer.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.
- C. Comply with NFPA 70.

2.02 MOLDED-CASE CIRCUIT BREAKERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Square D; Schneider Electric USA.
 - 2. ABB, Electrification Business.
 - 3. Eaton.
 - 4. Siemens Industry, Inc., Energy Management Division.
 - 5. Approved Equal.
- B. Circuit breakers shall be constructed using glass-reinforced insulating material. Current carrying components shall be completely isolated from the handle and the accessory mounting area.
- C. Circuit breakers shall have a toggle operating mechanism with common tripping of all poles, which provides quick-make, quick-break contact action. The circuit-breaker handle shall be over center, be trip free, and reside in a tripped position between on and off to provide local trip indication. Circuit-breaker escutcheon shall be clearly marked on and off in addition to providing international I/O markings. Equip circuit breaker with a push-to-trip button, located on the face of the circuit breaker to mechanically operate the circuit-breaker tripping mechanism for maintenance and testing purposes.
- D. The maximum ampere rating and UL, IEC, or other certification standards with applicable voltage systems and corresponding interrupting ratings shall be clearly marked on face of circuit breaker.
- E. MCCBs shall be equipped with a device for locking in the isolated position.
- F. Lugs shall be suitable for 140 deg F (60 deg C) rated wire on 125-A circuit breakers and below.
- G. Standard: Comply with UL 489 with interrupting capacity to comply with available fault currents.
- H. Thermal-Magnetic Circuit Breakers: Inverse time-current thermal element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
- I. Adjustable, Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
- J. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller, and let-through ratings less than NEMA FU 1, RK-5.
- K. Features and Accessories:
 - 1. Standard frame sizes, trip ratings, and number of poles.

2. Lugs: Mechanical type, suitable for number, size, trip ratings, and conductor material.
3. Electrical Operator: Provide remote control for on, off, and reset operations.

2.03 ENCLOSURES

- A. Enclosed Switches and Circuit Breakers: UL 489, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.
- B. Enclosure Finish: The enclosure shall be finished with gray baked enamel paint, electrodeposited on cleaned, phosphatized steel (NEMA 250 Type 1) or gray baked enamel paint, electrodeposited on cleaned, phosphatized galvanized steel (NEMA 250 Types 3R, 12).
- C. Conduit Entry: NEMA 250 Types 4, 4X, and 12 enclosures shall contain no knockouts. NEMA 250 Types 7 and 9 enclosures shall be provided with threaded conduit openings in both endwalls.
- D. Operating Mechanism: The circuit-breaker operating handle shall be directly operable through the front cover of the enclosure (NEMA 250 Type 1) or directly operable through the dead front trim of the enclosure (NEMA 250 Type 3R). The cover interlock mechanism shall have an externally operated override. The override shall not permanently disable the interlock mechanism, which shall return to the locked position once the override is released. The tool used to override the cover interlock mechanism shall not be required to enter the enclosure in order to override the interlock.
- E. Enclosures designated as NEMA 250 Type 4, 4X stainless steel, 12, or 12K shall have a dual cover interlock mechanism to prevent unintentional opening of the enclosure cover when the circuit breaker is ON and to prevent turning the circuit breaker ON when the enclosure cover is open.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 ENCLOSURE ENVIRONMENTAL RATING APPLICATIONS

- A. Enclosed Switches and Circuit Breakers: Provide enclosures at installed locations with the following environmental ratings.
 - 1. Indoor, Dry and Clean Locations: NEMA 250, Type 1.
 - 2. Outdoor Locations: NEMA 250, Type 3R.

3.03 INSTALLATION

- A. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
- B. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.
- C. Comply with NFPA 70 and NECA 1.

3.04 IDENTIFICATION

- A. Comply with requirements in Section 16075 "Electrical Identification."
 - 1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
 - 2. Label each enclosure with engraved metal or laminated-plastic nameplate.

3.05 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Tests and Inspections for Switches:
 - 1. Visual and Mechanical Inspection:
 - a. Inspect physical and mechanical condition.
 - b. Inspect anchorage, alignment, grounding, and clearances.
 - c. Verify that the unit is clean.
 - d. Inspect bolted electrical connections for high resistance using one of the two following methods:
 - 1) Use a low-resistance ohmmeter.
 - a) Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from

those of similar bolted connections by more than 50 percent of the lowest value.

- 2) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data or NETA ATS Table 100.12.
 - a) Bolt-torque levels shall be in accordance with manufacturer's published data. In the absence of manufacturer's published data, use NETA ATS Table 100.12.
- e. Verify correct phase barrier installation.
- f. Verify lubrication of moving current-carrying parts and moving and sliding surfaces.

2. Electrical Tests:

- a. Perform resistance measurements through bolted connections with a low-resistance ohmmeter. Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.

C. Tests and Inspections for Molded Case Circuit Breakers:

1. Visual and Mechanical Inspection:

- a. Verify that equipment nameplate data are as described in the Specifications and shown on the Drawings.
- b. Inspect physical and mechanical condition.
- c. Inspect anchorage, alignment, grounding, and clearances.
- d. Verify that the unit is clean.
- e. Operate the circuit breaker to ensure smooth operation.
- f. Inspect bolted electrical connections for high resistance using one of the two following methods:
 - 1) Use a low-resistance ohmmeter.
 - a) Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from those of similar bolted connections by more than 50 percent of the lowest value.
 - 2) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data or NETA ATS Table 100.12.

- a) Bolt-torque levels shall be in accordance with manufacturer's published data. In the absence of manufacturer's published data, use NETA ATS Table 100.12.
 - g. Inspect operating mechanism, contacts, and chutes in unsealed units.
 - h. Perform adjustments for final protective device settings in accordance with the coordination study.
 - 2. Electrical Tests:
 - a. Perform resistance measurements through bolted connections with a low-resistance ohmmeter. Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.
 - 3. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
 - 4. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports.
 - 1. Test procedures used.
 - 2. Include identification of each enclosed switch and circuit breaker tested and describe test results.
 - 3. List deficiencies detected, remedial action taken, and observations after remedial action.

3.06 ADJUSTING

- A. Adjust moving parts and operable components to function smoothly and lubricate as recommended by manufacturer.
- B. Set field-adjustable circuit-breaker trip ranges.

END OF SECTION

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DIVISION 17 - CONTROLS

SECTION 17001

CONTROL SYSTEM GENERAL REQUIREMENTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:
 - 1. General System Integration requirements.
 - 2. System Integration overview.
- B. Related Work specified elsewhere:
 - 1. Division 16 – ELECTRICAL
 - 2. Section 17200 “Process Instrumentation”
 - 3. Section 17950 “System Integration”

1.03 DEFINITIONS

- A. GC: General Contractor.
- B. SCADA: Supervisory Control and Data Acquisition.
- C. SI: System Integrator.

1.04 ACTION SUBMITTALS

- A. The submittal requirements listed in this section are additional requirements to those listed in other sections of these specifications and do not release the contractor from any requirements listed in other sections.

- B. Submit catalog cuts and shop drawings for materials and equipment in conformance with the requirements of Division 01 "Submittals". Electrical shop drawings shall include:
 - 1. Terminal identification diagrams and schedules.
 - 2. Point-to-point interconnection diagrams.
 - 3. Single line and elementary wiring diagrams, for all power, signal, control and lighting systems, together with panel layout drawings.
 - 4. Description of Operation.
 - 5. Actual details of conduit installation.

- C. Substitutions:
 - 1. Wherever the Electrical Contractor proposes to substitute equipment, he shall submit three sets of certified manufacturer's prints and one set of engineering data for the equipment he proposes to furnish along with one set of manufacturer's prints and one set of engineering data for the specified equipment, for evaluation and preliminary approval by the Engineer. Determination of acceptability by the Engineer shall be final. Samples may be requested by the Engineer for evaluation.

1.05 INFORMATIONAL SUBMITTALS

- A. The system integrator shall be subject to approval by the Owner.

- B. The system integrator shall meet the following minimum requirements:
 - 1. Actively involved in the control integration for control systems for a period of at least five years.
 - 2. Actively involved in the design and installation of Ethernet local area networks.
 - 3. Maintain a permanent staff of engineers and technicians who assemble, program, test and field service distributed control systems.
 - 4. Experienced in the installation, configuration, and programming of PC based SCADA software using the specified software.
 - a. The system integrator shall have provided these services for not less than two major projects, using the specified SCADA software, within the last 5 years.
 - b. This experience shall be documented by submitting two references, complete with project descriptions, services provided, contact names and phone numbers, for projects which included not less than 5 personal computers on a standard local area network using the specified SCADA software to monitor and control plant processes through programmable logic controllers.
 - c. Each of these systems shall be for a system with not less than 200 points.

5. Experienced in configuring and programming PLCs for industrial processes, such as a pumping station, including PID control.
 - a. The system integrator shall have provided these services for not less than two major projects within the last 5 years.
 - b. This experience shall be documented by submitting two references, complete with project descriptions, services provided, contact names and phone numbers, for projects which included multiple PLCs with not less than 100 points of I/O.
- C. In addition to the requirements of Division 01 "Submittals" submit the following information necessary to determine the adequacy of the system integrator.
 1. A detailed experience list of at least five control systems assembled and programmed by the system integrator. Include project descriptions, contact names and phone numbers in the list.
 - a. List shall include at least one control system upgrade of similar size and scope to this project.
 2. A description of the system integrator's capabilities. Include a listing of personnel who shall work on this project, test equipment available, and facility size and layout.
 3. All other references, resumes, and other information required to document that the proposed system integrator meets all requirements of the contract specifications and is capable of providing all required services.
 4. Provide a copy of the letter or stamp used to review and approve the submitted control equipment and designs of other sections of this specification.
- D. The Contractor, in addition to the requirements of Division 01 "Submittals", shall submit an expended initial schedule to the Engineer for approval showing all the work specified in this section. The contractor shall adjust the schedule as per the comments of the Engineer and resubmit the schedule for final approval by the Engineer.
- E. Installation Sequence Plan
 1. Submit a plan to add new I/O data points, and to cutover from the existing I/O data points monitored and calculated by the SCADA system.
- F. Programming
 1. Submit detailed description of all proposed control equipment programming prior to delivery to the site. The submittal shall include:
 - a. A tabular listing of all I/O points.
 - b. Written functional description, including:

- 1) Listing of the input signals, including a reference to the monitored instruments and devices.
 - 2) Listing of the output signals, including a reference to the controlled devices
 - 3) Listing of status tags and calculated values interfacing with all other plant control systems, including existing controllers and control systems specified in other sections and divisions of this Contract.
 - 4) A description of the control functions generating the output signals and calculated values
 - 5) Submit a Power-On, Start-Up sequence.
 - 6) Provide a state sequence table to indicate the state of each output under normal sequencing of a filters.
- c. Preliminary program listings
 - d. HMI workstation graphics
 - e. OIT panel graphics
 - f. Any programming manuals or other documents required to interpret the program listings.
2. A detailed written description of all proposed configuration and programming of the existing PLC and HMI system, including all I/O lists, nicknames, register locations, and related items.

G. Testing Plan

1. Detailed step-by-step test procedures to demonstrate all functions and features of each component of the control system.
 - a. These test procedures shall cover all control and communication equipment and materials specified under other sections of these specifications plus any additional items required to document that a complete and fully functional system has been installed.
2. Submit a detailed testing plan and procedure for each I/O data point and calculated value, including test forms.
3. Refer to TESTING subsection in Part 3 of this specification for additional requirements.
4. Test forms to document completion of field tests with written procedures, expected results, spaces for entry of actual results, spaces for comments, and spaces for sign off by the contractor, system integrator, and Plant representative.

1.06 CLOSEOUT SUBMITTALS

- A. Submit final As-Built Drawings in conformance with the requirements of Division 01 "Submittals". The As-Built Drawings shall depict the actual installation with

all items clearly identified, all dimensions exactly as installed, and all details correct.

- B. The electrical section of the As-Built Drawings shall consist of one-line diagrams of the complete installation, one-line and relay diagrams of the power systems, elementary diagrams of power control and signal circuits, complete connection and interconnection wiring diagrams for the entire installation, including items furnished under other contracts, conduit schedules and panelboard schedules.
- C. Submit Operating and Maintenance Manuals containing detailed information for all equipment and associated control systems furnished and installed under this Contract. O&M Manuals for the Contract shall meet all requirements of Division 01 - Submittals.
- D. O&M Manuals:
 - 1. Submit detailed final documentation including as-built (record) drawings, Operation & Maintenance manuals, software documentation, and other items required to fully document the system as installed and commissioned.
 - a. The O&M manual shall include a detailed functional description and alarm section with descriptive trouble-shooting procedures for each alarm.
 - b. See Division 01 "Submittals" for additional requirements.
 - 2. Include Final copies of all program listings with annotations, comments and cross reference tag list in both hard copy printout and on and CDs in O&M Manuals.
 - a. Load Final copies of all programs on the HMI workstation, along with the configuration programs, and verify communication and interaction of all development software with remote equipment prior to submitting O&M manual.
 - 3. Each O&M Manual shall include:
 - a. A complete set of reduced-size prints of the final As-Built Drawings.
 - b. A complete list of all relay settings, and all control and alarm point settings.
 - c. One copy of the manufacturer's spare parts list for all equipment furnished.
- E. IP Address Listing
 - 1. Submit a complete IP address listing of all existing and proposed Ethernet components.

F. I/O Data Base

1. Submit an I/O Database for all new and modified PLC data points. Database shall include:
 - a. Unique Signal ID (Record Key Value)
 - b. PLC Tag Name
 - c. OIT Tag Name
 - d. HMI Tag Name
 - e. I/O Description
 - f. Drawing Reference
 - g. Source Unit
 - h. Source Unit Address
 - i. Signal Type
 - j. Signal Level
 - k. Signal Format
 - l. Signal Power (Field or Panel)
 - m. Raw_zero
 - n. Raw_full
 - o. Eng_zero
 - p. Eng_full
 - q. Eng_units
 - r. Zero State
 - s. One State
 - t. Alarm

1.07 QUALITY ASSURANCE

- A. All electrical work to be performed and all materials to be furnished shall be in accordance with the Contract Drawings and Specifications, to the satisfaction of the Engineer, and the requirements of the following codes, regulations, and specifications:
 1. National Electrical Code (NEC)
 2. National Fire Protection Association (NFPA)
 3. National Electrical Manufacturer's Association (NEMA)
 4. Institute of Electrical and Electronic Engineers (IEEE)
 5. American National Standards Institute (ANSI)
- B. Materials:
 1. No materials of any kind shall be used that have not been approved by the Underwriters Laboratories, Inc., where UL provides such service, and each piece of equipment shall have marked thereon, where it can readily be observed, the name or trademark of the manufacturer.

2. Materials and equipment shall be the best of their several kinds and all work shall be performed in a neat, substantial and workmanlike manner, to the satisfaction of the Engineer.

1.08 FIELD CONDITIONS

- A. Written consent from the Owner or Owner's representative must be obtained not less than one week prior to carrying out any portion of the work included in this Contract which requires interruption of service and control/instrumentation systems.
- B. Unavoidable interruption of service must be confined to the daytime. Contractor will not receive extra compensation for overtime, should this become necessary to insure continued service.
- C. In connection with all of the foregoing, Contractor must have on the construction site, all materials, equipment, construction facilities, adequate supervision and a sufficient number of qualified workmen to insure carrying out all of the above work in the shortest possible time.
- D. All power, control and instrumentation wiring associated with equipment, panels, devices, etc. to be removed and replaced shall be identified, marked and then disconnected in order to make the equipment safe. See demolition drawings for more details.
- E. Notify Plant personnel prior to disconnect any existing signals.
- F. Prior to connecting any signals, each existing signal shall be tested to verify that the signal is within the expected range and suitable for connection to the new control system.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. The Owner, through a separate agreement, will purchase through Veolia a membrane system including controls hardware listed below:
 1. Panelview Plus 7 Standard 7", 24VDC
 2. CompactLogix 2 MB ENet controller
 3. Compact IO 24VDC input, 16 point
 4. Compact IO relay output module, 16 point
 5. Compact IO analog input module, 8 channel
 6. Compact IO analog output module, 4 channel
 7. Compact IO analog universal input module, 4 channel

8. 6- and 4- screw RTBs for controller power
 9. SLC conversion rack 10 slot
 10. Conversion cables
 11. Stratix 2000, Ethernet switch 5 copper ports, unmanaged
 12. Power Supply,120 W, 24V DC
- B. The Contractor shall install all Veolia provided equipment in the existing control panel. The Contractor will provide assistance to Veolia for Veolia's field research.
- C. The Contractor shall furnish and install all materials and equipment which are reasonably inferable to be part of the complete installation without any additional charge to the Owner.
- D. If, in the opinion of the Contractor, any work shown on the Drawings or called for under these Specifications is insufficiently specified or specified in such a manner as to make it impossible for him to produce first-class work which will meet the approval of the Engineer, he shall refer same to the Engineer before proceeding with the work and, if he fails to refer such instances to the Engineer, no excuse for poor workmanship will be entertained.

PART 3 - EXECUTION

3.01 CONTRACTOR RESPONSIBILITIES

- A. The Contractor shall retain the services of a qualified System Integrator to select equipment, provide any design details required to accommodate the selected equipment, completely configure and program the equipment, installation, test the systems, provide training, and prepare submittals and final documentation, all as herein specified.
- B. The Contractor shall coordinate the implementation and recommendations of the System Integrator with Contractor's staff and the Contractor's subcontractors.
- C. Review and approve all submitted control equipment and designs of other sections of this specification prior to submission to the Engineer.
- D. Supervise, inspect and test the installation of the control equipment and materials supplied under other sections of this specification.

3.02 SYSTEM INTEGRATOR RESPONSIBILITIES

- A. Selection and Evaluation of Components:

1. The System Integrator shall evaluate and select the individual components of the control system. The evaluation shall be based on the specification requirements, industry standards, compatibility between components and the experience of the System Integrator.
 - a. The System Integrator shall review and approve all control hardware, software and control system related components prior to submission to the engineer.
 - b. The System Integrator shall assist in the preparation of submittals and documentation of other sections of this specification as needed for a complete and coordinated hardware design.
 - c. The Engineer shall review all equipment following approval by the System Integrator.

B. Interfacing of Equipment:

1. The System Integrator shall interface between all components within the control system including those components supplied by others and existing equipment.
2. The system Integrator shall evaluate the interface between components and supply and/or modify systems to ensure compatibility.
3. The System Integrator shall provide any design assistance required to accommodate the selected equipment, to completely configure and program the equipment, and to the interface the new equipment to new and existing field devices.

C. Information Gathering:

1. The System Integrator shall investigate plant documentation and as-found conditions of the plant control system to establish the use and configuration of the hardware and software of each control signal affected under this contract. This investigation shall include the entire signal path from the initiating hard wired field device through to the control room operator interface terminal.

D. Coordination:

1. The System Integrator shall inspect the existing equipment to determine the best method for interfacing the new control system with the existing equipment. All work required to interface to existing equipment and communications networks shall be provided by the System Integrator.

E. Programming:

1. The System Integrator shall provide all programming, control logic and software for the system controls and monitoring.

2. The System Integrator shall interact with the Engineer to determine detailed operational conditions and shall incorporate those conditions into the system control logic.
3. All configuration and programming performed under this contract shall be fully documented by the system Integrator and shall become the property of the Owner.
4. Programming for the control algorithms shall be performed with the equipment vendor's latest configuration software using the IEC ladder diagram configuration.
5. Provide all manufacturer's services required for installation, startup, calibration, inspection, and training.
6. Provide all programming necessary to replace the functionality of the existing control system and to implement the new control functionality as shown on the Contract Drawings and/or herein specified.
7. Programming shall include All Programmable Logic Controller (PLC) and Operator Interface Terminal (OIT) programming services necessary to provide a fully functional control system.

F. Furnish, Install and Test:

1. Control panels, programmable controllers, enclosures and appurtenant equipment.
2. Software products, interface cables and related products.
3. Data communications equipment, materials and software required to interface the control equipment to the existing relocated SCADA network.
4. Relays, resistors, signal splitters or other devices required to condition input and output field signals for the control equipment.
5. Connect and test all input and output field wiring to and from the control equipment.

G. Installation:

1. The System Integrator shall oversee the installation and field connection of the control system.
2. The System Integrator shall make all the necessary modifications, additions and/or updates to hardware and software as required to accommodate the field conditions encountered.

H. Field Tests:

1. The System Integrator shall be present during the start-up of each programmable controller to respond to any discrepancies or questions which arise.
2. The System Integrator shall be on-call during the operational testing of the systems.
3. Perform the Final Acceptance Testing of all control equipment and materials supplied under this Contract.

I. Documentation:

1. The System Integrator shall provide detailed documentation for the design of the control system. As a minimum the following design documentation is required:
 - a. Cut sheets and descriptions of all components and hardware including ratings and limitations.
 - b. Wiring diagrams for all connections and controls.
 - c. Program logic on both hard copy printout and compact disk.
 - d. Flow charts describing the functioning of the control system.
 - e. As-built drawings for field wiring and connections.
 - f. Panel layouts.
 - g. Update existing plant control system documentation to show new connections to the PLCs.
2. The System Integrator shall document the field tests in accordance with detailed test reports.
3. The System Integrator shall coordinate the final documentation, including as-built drawings, O&M Manuals and Warranty information. All documentation shall be submitted to the Engineer for review and shall become part of the Operation and Maintenance Manuals.
4. The System Integrator or contractor shall label all wires and equipment with a unique non repeating system. The labeling identification numbers shall be included on the As-Built, existing loop and interconnection drawings.
5. The System Integrator shall provide special and standard warranty services.

J. Training:

1. The System Integrator shall provide or coordinate the training of control equipment provided for under this or other sections of the specification with Plant personnel.
2. Provide and coordinate the training of Owner personnel in the operation, configuration, and maintenance of the new control system.

K. All items and created works performed under this contract shall become the property of the Owner and shall be turned over to the plant personnel at the completion of Testing.

L. Provide continuing system integration support.

1. The Contractor shall provide for the supply of additional support days of onsite programming and configuration services above and beyond all programming and configuration requirements specified herein.
 - a. Coordinate with Veolia.

2. The bidder is advised that these services are to be provided at any time during the contract including up to 30 days following successful completion of the reliability acceptance tests for the system and that this contract shall remain open until that time.
3. The application of the additional work during construction shall be determined and approved by the Engineer and Owner.
4. The application of the additional work after the installation and acceptance of the new equipment shall be provided at the written request of the Owner.
 - a. The support shall be provided by the person who performs the original programming under this contract.
5. Services to be provided may include additional training, system troubleshooting, configuration and programming services, and other on-site services as required.

3.03 SCOPE AND PURPOSE

- A. The scope of work under this contract includes but is not limited to:
 1. All investigation work required to establish the use and configuration of the as-found hardware and software of each control signal affected under this contract.
 2. Document all changes to the plant's control system, including the updating of the plant's existing control system documentation to reflect changes made during construction and discrepancies found during the investigation work.
 3. Furnish, install, connect, configure and test PLC hardware, and software products and related items.
 4. Furnish, relocate, install, connect, configure and test Ethernet LAN and PLC LAN communication equipment hardware, software and related items.
 5. Furnish and install all equipment enclosures, power supplies, interconnecting cables, and support software and equipment required for a complete and functional system.
 6. Furnish and install all conduit, conductors, terminal boxes, and appurtenant equipment shown on the Contract Drawings, hereinafter specified, and/or required for a complete and fully functional installation to the satisfaction of the Engineer.
 7. Configure all equipment to operate satisfactorily and demonstrate that the system is properly operating.
 8. Provide training on the OIT, HMI and PLC hardware and software supplied and implemented under this contract.

9. Provide additional services from the System Integrator, as requested, for additional training, configuration and programming services, troubleshooting, and related activities.

3.04 SEQUENCE OF CONSTRUCTION

- A. The contractor shall begin the submittal process within two weeks after notice to proceed by submitting the name of the proposed System Integrator along with all information required to determine the adequacy of the proposed System Integrator (see Section 17950).
- B. Within one month after approval of the System Integrator, all hardware and software product submittals shall be delivered to the Engineer.
- C. Within two months after approval of the System Integrator, detailed installation submittals shall be delivered to the Engineer.
- D. All work shall be coordinated with plant maintenance personnel and approved by plant operations personnel prior to beginning any work.
- E. Written consent from the Owner or Owner's Representative must be obtained not less than one week prior to carrying out any portion of the work included in this Contract which requires interruption of service.
- F. Plant operations shall be notified no less than 24 hours prior to beginning any work that requires disruption of plant operation.
- G. Complete any work that can be performed without interference to the existing operation of the plant control system, such as conduit and cable installations, prior to disconnecting any existing control equipment.
- H. Provide and implement a workaround to address any Plant control or monitoring process that is affected by temporary or permanent work being performed under this contract.
- I. Train operators in the functional operation of the new equipment in each process area, as each process area comes on line.
- J. Demonstrate that the new and existing equipment is properly configured and operating by displaying process data at the local workstation and at other workstations on the existing SCADA system and verifying the accuracy of the displayed data.

3.05 FIELD ENGINEERING

- A. The Contract Drawings indicate the general location and arrangement of conduit, wiring devices, equipment, and other products. The Contractor shall adjust the indicated locations (subject to approval in the field) as necessary to:
 - 1. Comply with all applicable code requirements.
 - 2. Permit access for construction, inspection, testing, operation, and maintenance.
 - 3. Avoid conflict with pipes, mechanical equipment, structural openings (e.g., doors), and other obstructions, as built, whether or not as shown on the Contract Drawings.
 - 4. Produce a neat, workmanlike arrangement.
- B. The Contractor shall determine the proper connection points for all power, control, and signal wiring, regardless of whether the connection points are in equipment furnished under this Contract, in equipment furnished by others, or in existing equipment.
- C. The Owner will make available to the Contractor any reference drawings it may have. However, the Owner does not guarantee the correctness, completeness, or availability of reference drawings. Should the Contractor choose to rely upon the reference drawings, he does so at his own risk.
- D. The Contractor shall perform all field surveys, wire tracing, and other work required to ascertain the proper connection points for all wiring.
- E. The Contractor shall coordinate the making and sealing of all holes through structures to accommodate electrical conduits and supports for electrical equipment and shall submit working drawings thereof for the Engineer's approval.
- F. The Contractor shall ensure that proper service is provided to all mechanical equipment requiring electricity for power or control.

3.06 CONFIGURATION AND PROGRAMMING

- A. Completely configure all programmable controllers, data communications equipment, and field devices supplied under other sections of this specifications.
 - 1. Refer to Section 17100 "Control Equipment"
 - 2. Refer to Section 17950 "System Integration".
- B. Network Configuration

1. Provide all programming necessary to interface the new control and communication equipment with the existing SCADA communications system.
 - a. Modify and test the existing network of Human Machine Interface (HMI) operator interface units (client workstations) and SCADA system servers on the plant-wide local area network to accept the new and modified signals from the new PLC and HMI hardware.
2. Coordinate and organize the new control equipment communication addresses with the existing SCADA LAN at the plant.
3. Coordinate with Phone Company to provide dialup phone service.
4. Coordinate with Owner and ISP (Internet Service Provider) to provide Cable or FiOS Internet WAN service.
5. Setup and configure the WAN connection and make the HMI computer remotely accessible via Remote Desktop Services.
6. Completely configure the refresh rate and polling configuration of all nodes on the PLC and HMI LAN to optimize the transfer of data under worst case conditions.

C. I/O Coordination

1. Create, compile and install all databases required to monitor and control the plant processes from any and all Operator Workstations.
2. Create and configure a variable tag for each input point and each output point for each new PLC and other input devices.
3. Configure all calculated variables required to present the desired information.

3.07 GROUNDING

- A. All equipment furnished and/or installed under this Contract shall be grounded in accordance with the latest requirements of the National Electrical Code.

3.08 CALIBRATION

- A. All instrumentation and control devices, furnished under this Contract, shall be calibrated by competent, qualified technicians prior to final acceptance. A copy of the calibration data shall be submitted for approval.

3.09 IDENTIFICATION

- A. Nameplates shall be provided as required. Nameplates shall be black laminated plastic with white center, fastened with stainless steel screws.

- B. The size and shape of nameplates and lettering shall be in pleasing proportion for each specified location.

3.10 WARNING SIGNS

- A. Furnish all warning signs in conformance with NEC code and OSHA regulations.

3.11 DEFECTIVE MATERIALS AND EQUIPMENT

- A. Defective material and equipment or materials and equipment damaged in the course of installation or test shall be replaced or repaired in a manner meeting the approval of the Engineer. All materials and workmanship shall be of the best quality and all work done in a thorough manner in strict accordance with the rules and regulations of the American Insurance Association (formally the National Board of Fire Underwriters,) the state, and local authorities and the electric company that will furnish the power.

3.12 TRAINING

- A. Coordinate the training provided for under other sections of the specification with Owner personnel.
- B. Training shall be scheduled to the convenience of Plant Operations and shall be coordinated with the Owner or the Owner's Representative.
 - 1. The system integrator shall not schedule any training until it has been confirmed in writing that the proposed schedule is acceptable to the Owner.
 - 2. The system integrator shall submit the proposed schedule for each course not less than 4 weeks prior to the proposed training date.
 - 3. If the proposed dates for training are not convenient to plant personnel, the system integrator shall adjust the schedule accordingly.

3.13 CLEANING AND TOUCH-UP PAINTING

- A. The premises shall be kept free from accumulation of waste material and rubbish. Upon completion of work, the contractor shall remove materials, scraps, and debris from the site. Scratches, scrapes, or chips in interior or exterior surfaces of devices shall be touched-up with finishes matching as nearly as possible the type and color of the original finish.

END OF SECTION

DIVISION 17 - CONTROLS

SECTION 17050

BASIC CONTROL SYSTEM MATERIALS AND METHODS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:
 - 1. Equipment enclosures.
- B. Related Requirements:
 - 1. Section 17100 "Control Equipment".
 - 2. Section 17060 "Process Control Networks".

1.03 SCOPE OF WORK

- A. Design, Supply and Install all hardware and software products required to provide a complete and fully functional control system as shown on the Contract Drawings and/or herein specified.
- B. Design the control panels and field wiring interfaces required to implement the control equipment.
 - 1. All control panels shall be designed and manufactured in accordance with UL 508A, Standard for Industrial Control Panels, and NFPA 79, Electrical Standard for Industrial Machinery.
 - 2. All components shall be UL recognized.
- C. Connect and test all input and output field wiring to and from the control equipment.
- D. Provide all manufacturer's services required for installation, startup, calibration, inspection, and training.

- E. Provide all coordination required for system integrator's services as specified in Section 17950 "System Integration".
- F. Provide all equipment specified elsewhere for a complete and operable system.

1.04 WARRANTY

- A. Conform with all Contract Warranty requirements specified in the General Conditions and General Requirements.
- B. Provide an extended manufacturer's warranty on all products and equipment to remain in effect for not less than one year after the successful completion of the reliability acceptance tests.

1.05 ACTION SUBMITTALS

- A. Submit catalog cuts, shop drawings, and O&M manuals for all equipment in conformance with the requirements of Division 01 "Submittals".
 - 1. All control equipment hardware, software and control panel shop drawings shall be reviewed and approved by the System Integrator prior to submission to the Engineer.

PART 2 - PRODUCTS

2.01 EQUIPMENT ENCLOSURES

- A. Wall Mounted Enclosures
 - 1. UL 508A listed, wall mount, NEMA 12, ANSI gray painted steel, single door, hinged with quick-release latch enclosures with minimum dimensions as indicated on the drawings.
 - 2. Hoffman Bulletin A12-series or approved equal.

2.02 MISCELLANEOUS EQUIPMENT

- A. Wiring
 - 1. All wiring shall be in accordance with the applicable requirements of Division 16.
- B. Nameplates and Name Tags

1. Panel mounted tags shall be plastic; field mounted tags shall be stamped stainless steel.
2. Nameplate shall be engraved, rigid, laminated plastic type with adhesive back. Unless otherwise noted, color shall be black with white letters and letter height shall be 3/16 inch.

PART 3 - EXECUTION

3.01 DISCONNECTION AND REMOVALS

- A. All power, control and instrumentation wiring associated with equipment, panels, devices, etc. to be removed and replaced shall be identified, marked and then disconnected to facilitate their replacement and any related work.
- B. All materials no longer used shall be removed unless otherwise directed by the Engineer. Affected surfaces shall be repaired to conform to the type, quality, and finish of the surrounding surface in a neat and workmanlike manner.

3.02 INSTALLATION

- A. All items shall be installed in accordance with the manufacturer's recommendations.
- B. The Contractor shall furnish and install all material and hardware required to supply a complete and functional installation.
- C. Notify Plant personnel prior to disconnect any existing signals.

3.03 TESTING

- A. Test the hardware and software using simulated inputs and outputs prior to installation.
 1. The Contractor shall retain the services of a system integrator to provide detailed test plans and procedures to demonstrate and document that all equipment has been properly installed and configured for a full functional system which meets all contract requirements.
- B. Test the complete installed system by demonstrating that all signals are properly received and sent and that the control system operates as intended.

3.04 CLEANING AND TOUCH-UP PAINTING

- A. The premises shall be kept free from accumulation of waste material and rubbish. Upon completion of work, the Contractor shall remove materials, scraps, and debris from the site. Scratches, scrapes, or ships in interior or exterior surfaces of devices shall be touched up with finishes matching as nearly as possible the type and color of the original finish.

- B. All material, equipment, and workmanship shall be subject to inspection by the Engineer or his representatives. In the event the Engineer finds the materials or workmanship not in accordance with these Contract Documents, the work or materials shall be removed and replaced, or corrected, by and at the expense of the Contractor.

END OF SECTION

DIVISION 17 - CONTROLS

SECTION 17060

PROCESS CONTROL NETWORKS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:
 - 1. Communication Equipment and Materials.
 - 2. Ethernet LAN Equipment.
- B. Related Requirements:
 - 1. Section 17050 "Basic Control System Materials and Methods"
 - 2. Section 17100 "Control Equipment".

1.03 SCOPE OF WORK

- A. Provide all network equipment for a complete and functional SCADA system.

1.04 WARRANTY

- A. Conform with all Contract Warranty requirements specified in the General Conditions and General Requirements.
- B. Provide an extended manufacturer's warranty on all products and equipment to remain in effect for not less than one year after the successful completion of the reliability acceptance tests.

1.05 SUBMITTALS

- A. Submit catalog cuts, shop drawings, and O&M manuals for all equipment in conformance with the requirements of Section 17050 "Basic Control System Materials and Methods".

PART 2 - PRODUCTS

2.01 COMMUNICATION EQUIPMENT AND MATERIALS

- A. For premises wiring cable see applicable sections of Division 16.

2.02 ETHERNET LAN EQUIPMENT

- A. Managed Ethernet Switch
 - 1. Standalone 8-port managed Ethernet switch with Ring topology support and suitable for any harsh industrial environment.
 - a. IPv6 Ready logo awarded (IPv6 Logo Committee certified)
 - b. IEEE 1588 PTP (Precision Time Protocol) for precise time synchronization of networks
 - c. DHCP Option 82 for IP address assignment with different policies
 - d. Modbus/TCP industrial Ethernet protocol supported
 - e. Turbo Ring and Turbo Chain (recovery time less than 20 ms at full load), and RSTP/STP (IEEE 802.1w/D)
 - f. IGMP snooping and GMRP for filtering multicast traffic
 - g. Port-based VLAN, IEEE 802.1Q VLAN and GVRP to ease network planning
 - h. QoS (IEEE 802.1p/1Q) and TOS/DiffServ to increase determinism
 - i. Port Trunking for optimum bandwidth utilization
 - j. RMON for efficient network monitoring and proactive capability
 - k. SNMPv1/v2c/v3 for different levels of network management
 - l. IEEE 802.1X, HTTPS, and SSH to enhance network security
 - m. Bandwidth management prevents unpredictable network status
 - n. Lock port function for blocking unauthorized access based on MAC address
 - o. Port mirroring for online debugging
 - p. Automatic warning by exception through e-mail and relay output
 - q. Works with MXview industrial network management software
 - r. -40 to 75°C operating temperature range (T models)
 - 2. Moxa EDS-508A Series 8-port managed Ethernet switch, or Approved Equal

PART 3 - EXECUTION

3.01 CONTROL SYSTEM COMMUNICATION COORDINATION

- A. Modify LAN cabling and network hubs/switches throughout the plant via new and existing conduit systems, as shown on the contract drawings.
- B. Establish communications between the Human Machine Interface (HMI) server and each programmable logic controller (PLC) as they become available and verify monitoring of I/O data points.
- C. Establish communications between the plant' PLC programming workstation and each programmable logic controller (PLC) as they become available, and verify programmability, upload and downloading functions.
- D. Cutover PLC data points to the SCADA monitoring system.
- E. Ethernet Patch Cables
 - 1. Provide and install copper to connect from patch panels to network switches, hubs, media converters, and other network devices.
 - 2. Coordinate and supply suitable connectors for each patch cable as required for each application.
- F. Refer to Section 17950 "Systems Integration" for additional programming and system integration requirements.

END OF SECTION

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DIVISION 17 - CONTROLS

SECTION 17100

PROGRAMMABLE LOGIC PROCESS CONTROLLERS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:
 - 1. Operator Interface Terminals.
- B. Related Requirements:
 - 1. Section 17060 "Process Control Networks".

1.03 SCOPE OF WORK

- A. Provide all programmable logic controllers, operator interface terminals, and all equipment for a complete and functional PLC control panel in each area of the plant as indicated in the contract drawings.
- B. Coordinate with Section 17050 "Basic Control System Materials and Methods" for additional control panel hardware and control panel enclosures.

1.04 WARRANTY

- A. Conform with all Contract Warranty requirements specified in the General Conditions and General Requirements.
- B. Provide an extended manufacturer's warranty on all products and equipment to remain in effect for not less than one year after the successful completion of the reliability acceptance tests.

1.05 SUBMITTALS

- A. Submit catalog cuts, shop drawings, and O&M manuals for all equipment in conformance with the requirements of Section 17050 "Basic Control System Materials and Methods".

PART 2 - PRODUCTS

2.01 OPERATOR INTERFACE TERMINALS (OIT)

- A. Graphic Panel Touch Screen shall be Fully graphical touchscreen display with serial port configured for communication to local PLC.
- B. Manufacturer:
 - 1. Allen Bradley, Panelview Plus 7 Performance to match PLC manufacturer.
 - 2. No approved equal accepted.
- C. General Requirements:
 - 1. 15 inch color TFT LCD, 1024 x 768 XGA, 18-bit color graphics
 - 2. (2) Ethernet Ports, (2) USB Ports, 1 SD card slot for external storage.
 - 3. Supports Modbus TCP/IP Communication.
 - 4. 24V DC Powered
 - 5. Built-in Ethernet 10/100 TCP/IP for programming
- D. Programming Software:
 - 1. FactoryTalk View Studio for Machine Edition, FactoryTalk ViewPoint, version 2.6 or later.

PART 3 - EXECUTION

3.01 CONFIGURATION AND PROGRAMMING

- A. Configure each new programmable logic controller (PLC) for all inputs and outputs.
- B. Configure and program the new programmable logic controllers to allow monitoring and control from the control system.
- C. Configure the new PLC to communicate with the control system I/O servers via Ethernet connections.

- D. Coordinate and document PLC LAN Node numbering and IP addresses with Plant personnel before installation.
- E. Qualified representatives of the PLC manufacturer or a qualified systems integrator shall perform all configuration and programming.
- F. Completely configure and program each PLC as required outlined in Section 17950 "Basic Control System Materials and Methods"

END OF SECTION

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DIVISION 17 - CONTROLS

SECTION 17200

PROCESS INSTRUMENTATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:
 - 1. Level Instruments
 - 2. Flow Instruments
- B. Related Work specified elsewhere:
 - 1. Division 16 – ELECTRICAL

1.03 DEFINITIONS

- A. PSI: Pounds per Square Inch.

1.04 ACTION SUBMITTALS

- A. Operating instructions, manuals and shop drawings shall be submitted in accordance with Division 01 Section, SUBMITTALS.
- B. Instrument supplier shall review the Contract drawings to verify suitability of the supplied instrument for the intended application prior to submittal process.
 - 1. Provide verification of this review process by instrument and application.
- C. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for transfer switches.

2. Include rated capacities, operating characteristics, electrical characteristics, and accessories.

D. Shop Drawings:

1. Catalog Cutsheets.
2. Field wiring diagrams.
3. Construction drawings and engineering data defining materials of construction, dimensions, weights and sizes.

1.05 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

1.06 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For each type of product to include in emergency, operation, and maintenance manuals.

1. In addition to items specified in Division 01 include the following:
 - a. Features and operating sequences, both automatic and manual.
 - b. List of all factory settings of relays; provide relay-setting and calibration instructions, including software, where applicable.

- B. Operation and Maintenance Manual:

1. Submit complete bound manuals for all hardware and software components assembled into 3 ring binders.
2. Include:
 - a. Shop Drawing information
 - b. Calibration information
 - c. Configuration of each device, as configured at time of Maintenance Training.
 - d. Flash Drive copies of all custom programs incorporated.

1.07 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace components of transfer switch or transfer switch components that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 12 months from date of Substantial Completion

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Contractor

1. The Contractor shall be responsible for the complete supply and installation of process instrumentation and control systems furnished by a single company regularly engaged in the manufacture of process instrumentation systems.
2. Functional system data is described herein and is augmented by accompanying product specifications. All elements shall be provided as shown and/or required. Additional elements such as power supplies, current repeaters, and other such elements as may be required to complete the system shall be provided even though not shown.
3. All material shall be new, free from defects, and of the quality specified or shown. Each type of material shall be of the same manufacturer throughout the work. All material shall be the product of established, reputable manufacturers normally engaged in the production of the particular item being furnished.

B. Instrumentation Supplier

1. All instrumentation equipment, panels, sensors, transmitters and other system components shall be supplied by one instrumentation manufacturer who shall be responsible for total system design, integration and functioning of the system and all components, including those items manufactured by others but furnished by the instrumentation supplier.
2. The instrumentation supplier must have the proven skill, experience, ability, facilities, and qualified personnel necessary to successfully, timely and properly complete the involved work. During the bid evaluation period, any proposed instrumentation supplier will be evaluated to consider their ability to satisfy the foregoing requirements.
3. The instrumentation supplier must assign sufficient qualified personnel to the project to assure the timely and proper completion of the work. Full, continuous, and detailed supervision of the work will be required.

C. Equipment Requirements

1. The product Specifications include description of instrumentation items used in systems. In certain instances, this description is followed by at least one (1) brand name (and/or model number) and an "or equal" provision. Each product submitted under the "or equal" provision will be reviewed as to whether it is acceptable as an equal.
2. In conducting such a review, the County shall consider the comparability of the specifically named products with the "or equal" products, including specifically their relative performances. Such review shall be based both

on the product individually and its interrelationship with all other aspects of the instrumentation system.

2.02 PRODUCT IDENTIFICATION

- A. All the equipment shall have a stainless steel name plate permanently affixed in a conspicuous place on which is plainly marked the manufacturer's name, address, model number, and loop number as stated in the Specifications and shown on the Drawings. The nameplate of a distributing agent only is not acceptable.

2.03 LEVEL INSTRUMENTS

A. Float Switch (LS)

1. General

- a. Contact System shall be a Microswitch with a minimum of 2×10^7 operations
- b. Output shall be dry contact with max load rating of (AC: 250V @16A or DC:220V@.5A or 24V@16A)
- c. The operating temperature shall be between -20 to 60 degrees F
- d. The Cable shall be made highly flexible oil resistant material and having adequate tensile strength.
- e. The float housing material shall be made of Polypropylene
- f. All floats shall be provide with counter weights
- g. Float Switch shall be a MJK model 7030 or approved equal.

B. Ultrasonic Level Transmitters (LT)

- 1. Ultrasonic level transmitter shall be a microprocessor-based electronic unit consisting of a sensor assembly, and/or transmitter, and an interconnecting cable for remote monitoring.
- 2. The sensor shall be encapsulated in a chemical and corrosion-resistant material such as Kynar or CPVC, and shall be suitable for operation over a temperature range of -20° to $+150^{\circ}$ F and a relative humidity of 10 to 100 percent.
- 3. The sensor shall be compatible with the process media being measured.
- 4. The ultrasonic level transmitter shall have automatic compensation for changes in air temperature at the sensor location.
 - a. If separate temperature sensing probes are provided, they shall be mounted with or adjacent to the ultrasonic sensor, as recommended by the manufacturer.

5. The transmitter shall have a four-digit LCD display scaled to read in engineering units.
 - a. The transmitter shall be designed to ignore momentary level spikes, false targets, or momentary loss-of-echo.
 - b. The transmitter output shall be an isolated 4-20 mA dc signal linearly proportional to the measured level range.
 - c. Output shall be characterized to be proportional to the tank volume instead of to the tank level.
 - d. Calibration parameters shall be entered through a keypad on the unit and shall be stored in nonvolatile EEPROM memory.
 - e. Accuracy of the transmitted signal shall be 0.25% percent of the level range.
 6. Provide a remotely mounted digital level indicator shall be provided for the level transmitters where indicated on the Drawings or in the Schedules.
 7. The ultrasonic level transmitter shall be Mobrey-Rosemount MSP 400/900 series, Krohne Optisound, Siemens SITRANS LU, or approved equal.
- C. Submersible Level Transducer and Transmitters (For Raw Water Clear Well Level) (LT)
1. Submersible level transducer
 - a. Material: 316 Stainless Steel
 - b. Electrical: Input: 15 - 45 VDC Output: 4 – 20 mADC/digital
 - c. Electrical Connection: Attached four wire 20GA shielded cable
 - d. Ranges: 0-16 feet
 - e. Temperature Limits: -40 – 248 degrees F
 - f. Accuracy: +/- 0.1%
 - g. Diameter: 1.25 inch
 - h. Weight: 8 oz.
 - i. Submersible Level Transducer shall be Sigma Controls, Inc. model 6000MP series
 - j. Submersible Level Transducer shall be supplied with a loop power display by Precision Digital Corporation model PD660.

2.04 FLOW INSTRUMENTS

- A. Magnetic Flow Meter (FE)
 1. Magnetic flow meter systems shall include a magnetic flow tube and a microprocessor-based "smart" transmitter that is capable of converting and transmitting a signal from the flow tube.

- a. Magnetic flow meters shall utilize the characterized field principle of electromagnetic induction, and shall produce DC signals directly proportional to the liquid flow rate.
2. Each meter shall be furnished with a stainless steel or carbon steel metering tube and carbon steel flanges with a polyurethane, ceramic, neoprene, or Teflon liner as required by the application and/or as specified herein.
 - a. Liner shall have a minimum thickness of 0.125 inches.
 - b. The inside diameter of the liner shall be within 0.125 inches of the inside diameter of the adjoining pipe. Liner protectors shall be provided on all flow tubes.
3. The flow tube shall be provided with flush mounted electrodes.
 - a. Ultrasonic electrode cleaning shall not be acceptable.
4. Grounding rings shall be provided for all meters.
5. All materials of construction for metallic wetted parts (electrodes, grounding rings, etc.) shall be minimum 316 stainless steel, but shall be compatible with the process fluid for each meter in accordance with the recommendations of the manufacturer.
6. Flow tube shall be rated for pressures up to 1.1 times the flange rating of adjacent piping.
 - a. System shall be rated for ambient temperatures of -30 to +65C.
 - b. Non-metallic transmitter housings shall not be acceptable.
7. Meters located in flood hazard areas:
 - a. Flow tube meter housings shall be rated for continuous submergence to 30 ft
 - b. Transmitter shall be separately mounted and rated for outdoor usage.
 - c. Provide sun shade housing for transmitter.
8. Meters located in other than flood hazard areas:
 - a. Meter and transmitter housings shall meet NEMA 4X requirements as a minimum.
 - b. Transmitter shall be mounted integrally onto flowtube.
9. The transmitter shall provide pulsed DC coil drive current to the flow tube and shall convert the returning signal to a linear, isolated 4-20 mA DC signal.
 - a. The transmitter shall utilize "smart" electronics and shall contain automatic, continuous zero correction, signal processing routines for

- noise rejection, and an integral LCD readout capable of displaying flow rate and totalized flow.
- b. The transmitter shall continuously run self-diagnostic routines and report errors via English language messages.
10. Transmitter shall have a dual compartment housing with the terminal block isolated from the electronics compartment.
 11. The transmitter's preamplifier input impedance shall be a minimum of 109-1011 ohms which shall make the system suited for the amplification of low-level input signals and capable of operation with a material build up on the electrodes.
 12. The transmitter shall provide an automatic low flow cutoff below a user configurable low flow condition (0-10%).
 - a. The transmitter's outputs shall also be capable of being forced to zero by an external contact operation.
 13. Each flow tube shall be factory calibrated and assigned a calibration constant or factor to be entered into the associated transmitter as part of the meter configuration parameters.
 - a. Manual calibration of the flow meter shall not be required.
 - b. Meter configuration parameters shall be stored in non-volatile memory in the transmitter.
 - c. An output hold feature shall be provided to maintain a constant output during configuration changes.
 14. The transmitter shall be capable of communicating digitally with a remote configuration device via a frequency-shift-keyed, high frequency signal superimposed on the 4-20 mA output signal.
 - a. The remote configuration device shall be capable of being placed anywhere in the 4-20 mA output loop.
 - b. A password-based security lockout feature shall be provided to prevent unauthorized modification of configuration parameters.
 15. The transmitter shall have built in diagnostics including high process noise detection, electronics temperature monitoring, wiring and grounding verification, coil fault detection and empty pipe detection.
 - a. The transmitter shall also have the ability to enable internal calibration verification in the field. Calibration verification must not require external equipment.
 16. Accuracy shall be 0.50% of rate over the flow velocity range of 0.3 to 10.0 m/s. Repeatability shall be 0.1% of rate; minimum turndown shall be 100:1. Minimum required liquid conductivity shall not be greater than 5 uS/cm.
-

- a. Maximum response time shall be adjustable between 1 and 100 seconds as a minimum.
 - b. Transmitter ambient temperature operating limits shall be -10 to +50 C. Power supply shall be 115 VAC, 60 Hz.
17. Flow tubes shall be 150-lb flange mounted unless otherwise noted.
- a. The cables for interconnecting the meter and transmitter shall be furnished by the manufacturer.
 - b. Transmitter shall be mounted integrally on flow tube, wall, or 2-inch pipe mounted as shown in the Drawings and/or as specified.
18. Magnetic flow meter shall be Siemens or approved equal by Owner.
- B. Flow Indicating Transmitter (FIT)
- 1. General
 - a. Enclosure: NEMA 4X
 - b. Display: 8 digit LCD display
 - c. Power Requirements: 120Vac @ 60Hz with power consumption of 15 Watts.
 - d. Outputs: 4-20 ma DC signal proportional to flow
 - 2. The Flow Indicating Transmitter shall be Sensus Metering Systems Model 110AR-K.

2.05 SPARE PARTS

- A. Furnish one portable primary head simulator for calibration and testing of magnetic flowmeter signal converters.
- 1. The calibrator shall be furnished complete with rechargeable battery pack, test leads, spare battery pack, charger, carrying case and accessories.
 - 2. Calibrator shall be furnished by the flowmeter manufacturer and shall be fully matched to the instrumentation furnished.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Description of Work
- 1. Provide all labor, material and necessary equipment to install instrumentation and control systems and be responsible for the satisfactory operation of the entire system as specified herein and as shown on the drawings.

2. Work includes supplying erecting, testing and placing in operation the system specified.
3. Work includes the supply and installation of all process measuring elements, transmitters interconnecting wiring and process taps as specified herein and indicated on the drawings.
4. Work includes the provision and connection of all wiring to and from every electrical device furnished under this Section including 120 volt power wiring and all instrumentation and control wiring.
 - a. All wiring shall be in accordance with Section NEC A1 requirements.
 - b. Instrumentation and Control Wiring noted within this Specification Section includes:
 - 1) Circuits used to carry analog signals
 - 2) Circuits used to start and stop equipment
 - 3) Circuits used to key a control function or serve as an interlock
 - 4) Circuits used to indicate equipment operating status
 - 5) Circuits used to actuate alarms.
 - c. Work includes the provision and installation of and all piping, manual shut-off valves, and mounting hardware (e.g. nuts, bolts, washers, pipe stands, or cinch anchors) associated with connecting or mounting the instrumentation, as described herein.

B. General

1. Equipment shall be located so that it will be readily accessible for operation and maintenance.
2. The Contractor shall examine the Contract Drawings and shop drawings for the various equipment in order to determine the best arrangement for the work as a whole, and shall use personnel skilled in the applicable trade for the erection of the various materials and interconnections.

C. Equipment Mounting and Support

1. Field instruments shall be mounted in the areas specified or otherwise noted.
2. Instruments attached directly to concrete shall be spaced out from the mounting surface not less than 1/2 inch by use of phenolic spacers or framing channel.
3. Expansion shields or cast-in-place inserts shall be used for securing equipment or supports to concrete surfaces.
4. Unless otherwise noted, field instruments shall be mounted between 48 and 60 in. above the floor or work platform.

D. Transmitters

1. Flow and pressure transmitters shall be connected to the process piping with nipples, fittings and/or tubing of material compatible with the process fluid.
2. Where transmitters are supported from process piping, leveling saddles shall be provided.
3. Transmitters shall be oriented such that output indicators are readily visible.
4. Electrical connections to transmitters and elements mounted on process piping or equipment shall be made through liquid-tight flexible conduit.
5. The fitting materials shall be compatible with the process fluid.

E. Magnetic Flowmeters

1. Ground magnetic flow meter flow tubes and grounding rings in strict accordance with the manufacturer's recommendations.

3.02 ELECTRICAL WORK

A. Signal wiring shall be carried in raceways or conduit provided in accordance with other sections of this Division of the Specifications.

1. Shielded twisted pairs carrying 4-20 mA_{dc} and other low level signals shall be run in conduits or raceways separate from all other control and power wiring.
 - a. All analog circuits shall be run as twisted pairs or triads.
 - b. In no case shall a circuit be made up using conductors from different pairs or triads.
 - c. Triads shall be used wherever three (3) wire circuits are required.
 - d. Triads shall not be formed by using two (2) pairs.
2. Terminal blocks shall be provided at all instrument cable junctions, and all circuits shall be identified at such junctions.
3. Signal circuits shall, in general, be run without splices between instruments, terminal boxes or panels.

B. Shields shall, in general, be bonded to the ground bus at the control panel and isolated at all other locations.

1. Terminal blocks shall be provided for interconnecting shield drain wires at all junction boxes.

C. Alternating current power supply connections for panel mounted equipment shall be by cord and plug (where practicable).

1. Field mounted units shall be wired in solid and provided with a power disconnect switch either internally or adjacent to the unit.

2. Where multiple field mounted units are fed from a single circuit breaker, each field mounted unit shall be protected by individual draw-out fuses.

3.03 FIELD QUALITY CONTROL

A. Factory Tests

1. Testing of Individual Components
 - a. Each item of equipment shall be fully factory inspected and tested for function, operation and continuity of circuits.
 - b. Each instrument shall be factory calibrated. Calibration sheets verifying instrument accuracy shall be supplied.
2. Full System Tests
 - a. An operation check of the entire system shall be performed by the instrumentation supplier at his factory. Power and manually adjustable measurement and control circuits shall be connected to the central control for simulating the functions specified within the Specification section.
 - b. The County shall be notified at least ten (10) days in advance of any factory systems tests and reserves the right to have its representatives in attendance.

B. Analog Instrument Calibration

1. All analog instruments shall be installed such that taps and parts, etc. are available for in-place calibration and test without removal. For those instruments where such in situ calibrations are not feasible (e.g. pH immersion electrodes, etc.), other calibration methods shall be provided subject to review by the County.
2. Field calibration shall be achieved using a minimum of five (5) points (0, 25, 50, 75, and 100 percent) for calibration. Additional points may be required by the County for non-linear instruments.
3. Receiving elements such as controllers, final operators, etc. shall be observed and readings documented during transmitter exercising to demonstrate correct operation of entire control loop.
4. Other elements such as controllers, final operators, etc. shall be exercised to demonstrate correct operation.

C. Pretesting:

1. After installation, align, adjust, and balance system and perform complete pretesting to determine compliance of system with requirements in the Contract Documents.
2. Correct deficiencies observed in pretesting.

3. Replace malfunctioning or damaged items with new ones and retest until satisfactory performance and conditions are achieved.
4. Prepare forms for systematic recording of acceptance test results.
5. After pretesting is complete, provide a letter certifying that installation is complete and fully operable; include names and titles of witnesses to preliminary tests.

D. Operational Tests

1. An operation check of the entire system shall be performed by the instrumentation supplier after installation to verify operation.
2. Schedule tests after pretesting has been successfully completed.
3. Test all modes of system operation at each device.
4. Power and manually adjustable measurement and control circuits shall be connected to the control system to verify the functions specified within the Specification section.
5. Inspection: Verify that units and controls are properly labeled and interconnecting wires and terminals are identified.
6. Electrical Tests: Minimum required tests are as follows:
 - a. Verify the absence of unwanted voltages between circuit conductors and ground.
 - b. Test all conductors for short circuits using an insulation-testing device.
 - c. With each circuit pair, short circuit at the far end of circuit and measure circuit resistance with an ohmmeter. Record circuit resistance of each circuit.
7. All conditions of operation shall be simulated to demonstrate that each system operates properly.
8. Test each initiating and indicating device for operation and proper response at local control stations, PLC panel and supervisory control station.

E. Report of Tests and Inspections:

1. Prepare a written record of tests, inspections, and detailed test results in the form of a test log.
2. Tag all equipment, stations, and other components for which tests have been satisfactorily completed.

F. Acceptance

1. The system will not be accepted until all equipment satisfies the acceptance test requirements. The complete system shall operate continuously during an acceptance test period of not less than thirty (30) days with no down-time of the complete system resulting from failure of hard-

ware. Downtime of the system or portions of the system resulting from the following causes will not be considered system failures:

- a. Downtime resulting from an outage of the main power supply provided that automatic shutdown and restart of the system satisfies the requirements of these Specifications.
- b. Downtime of a portion of the system resulting from failure of a communications channel provided that the system operated as specified under this condition.
- c. Downtime caused by operator error.

3.04 START-UP

A. Installation Assistance

1. Provide the services of a qualified factory engineer to supervise the installation, to test and make any adjustments required, and to place the completed system in operation.

B. System Operation Training

1. The Contractor shall have the instrumentation supplier provide a factory trained engineer to instruct the County's operating personnel in the use, operation, care, and maintenance of the process control instrumentation.
2. The training shall be conducted on-site and be presented in a manner to impart thorough understanding of the systems and equipment provided.
3. The training shall be given to the plant personnel designated by the County who will be responsible for the plant operation during each work shift. The personnel shall sign a certificate presented by the Contractor that they have been trained on the plant equipment and they thoroughly understand the operation, care and maintenance of the equipment.
4. When the County is ready to have his personnel trained, the Contractor will be so notified by the County. The Contractor will then ensure that the manufacturer's representatives are available on-site to conduct the required training.

3.05 EXPENDABLES

- A. One (1) year's supply of expendables shall be provided as noted within this Specification Section. Expendables (charts, ink, test chemicals, etc.) used during calibration and checkout prior to plant acceptance shall be replenished at the Contractor's expense to insure a full year supply at the time of plant acceptance.

3.06 MAINTENANCE

- A. Corrective maintenance shall be performed only by a factory trained service technician specifically trained for servicing the types of equipment furnished under this Contract.

END OF SECTION

DIVISION 17 - CONTROLS

SECTION 17950

SYSTEM INTEGRATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:
 - 1. PLC Software.
- B. Related Requirements:
 - 1. Section 17100 "Control Equipment".
 - 2. Section 17060 "Process Control Networks"

1.03 DEFINITIONS

- A. OIT: Operator Interface Terminal – A touch screen on a control panel.
- B. PLC: Programmable Logic Controller.

1.04 ACTION SUBMITTALS

- A. Product Data:
 - 1. Programming software.

1.05 INFORMATIONAL SUBMITTALS

- A. SCADA and OIT Screen shots.
- B. Test and Evaluation Reports.

- C. Field Quality-Control Submittals:
 - 1. Field quality-control reports.

1.06 CLOSEOUT SUBMITTALS

- A. Maintenance Contracts:
 - 1. Maintenance service.
 - 2. Software service agreement.
- B. Operation and Maintenance Data.
- C. Warranty Documentation:
 - 1. Manufacturers' special warranties.
 - 2. Installer's special warranties.
- D. Software and Firmware Operational Documentation:
 - 1. Software operating manuals.
 - 2. Program Software Backup: On USB media.
 - 3. Device address list.
 - 4. Printout of software application and USB graphic screens.

1.07 WARRANTY

- A. Special Warranty: Manufacturer and Installer agree to repair or replace components that fail in materials or workmanship within three (3) years.

PART 2 - PRODUCTS

2.01 PROGRAMMING SOFTWARE

- A. All Programming shall be performed using version and edition of the programming software currently owned and maintained by the Owner at the Plant.
- B. The Contractor's System Integrator shall be responsible for maintaining their own version of the programming software for their own purposes, and shall not be permitted to use or work with the Owner's software for the execution of the work required under this Contract.
 - 1. Refer to Section 17950 - System Integration, for system programming requirements.

PART 3 - EXECUTION

3.01 PROGRAMMING

A. Programmable Logic Controller (PLC) Programming

1. Programming for the control algorithms shall be performed with the equipment vendor's latest configuration software using the IEC ladder diagram configuration.
 - a. All Programming shall be done in ladder logic format; function blocks, structured text, or other programming methods shall not be acceptable.
2. Configure the new PLC equipment to monitor and control the field devices indicated on the Drawings.
3. Map each hardwired discrete input I/O point to a series of consecutive registers in the PLC CPU.
4. Map each hardwired analog input I/O point to a series of consecutive registers in the PLC CPU.
 - a. Program a second set of analog values, stored in a series of consecutive registers, representing the engineering value of each of the input and output signals.
 - b. Multiply the raw numerical value by the engineering scale, plus the zero offset
5. Program the control logic required for the analog outputs and discrete outputs as indicated under Function Description.
6. Program the control logic required to generate and maintain a calculated value to be passed to the HMI system.
 - a. Provide calculated values for all functions indicated in this and other sections of these specifications.

B. All security shall be the Microsoft Corporation "Local Users and Groups" configured in Windows computer management window and shall be active for any remote access.

1. Provide three (3) levels of operational access for the supervisory control system as follows:
 - a. Operator Access - limited to access required for system operation
 - b. Supervisory Access - access to system characteristics & alarms
 - c. Engineer Access – Limited to Veolia's agreement

END OF SECTION

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RIDDLE FARM WASTEWATER TREATMENT PLANT EQUIPMENT UPGRADES

GMB FILE NO. 220047
WORCESTER COUNTY, MARYLAND

LIST OF DRAWINGS

GENERAL

G-1 TITLE SHEET

CIVIL

C-1 SITE PLAN
C-2 SITE DETAILS
C-3 FLOW DIAGRAM
C-4 DESIGN VALUES FOR 0.277 MGD PERMITTED FLOW

PROCESS MECHANICAL

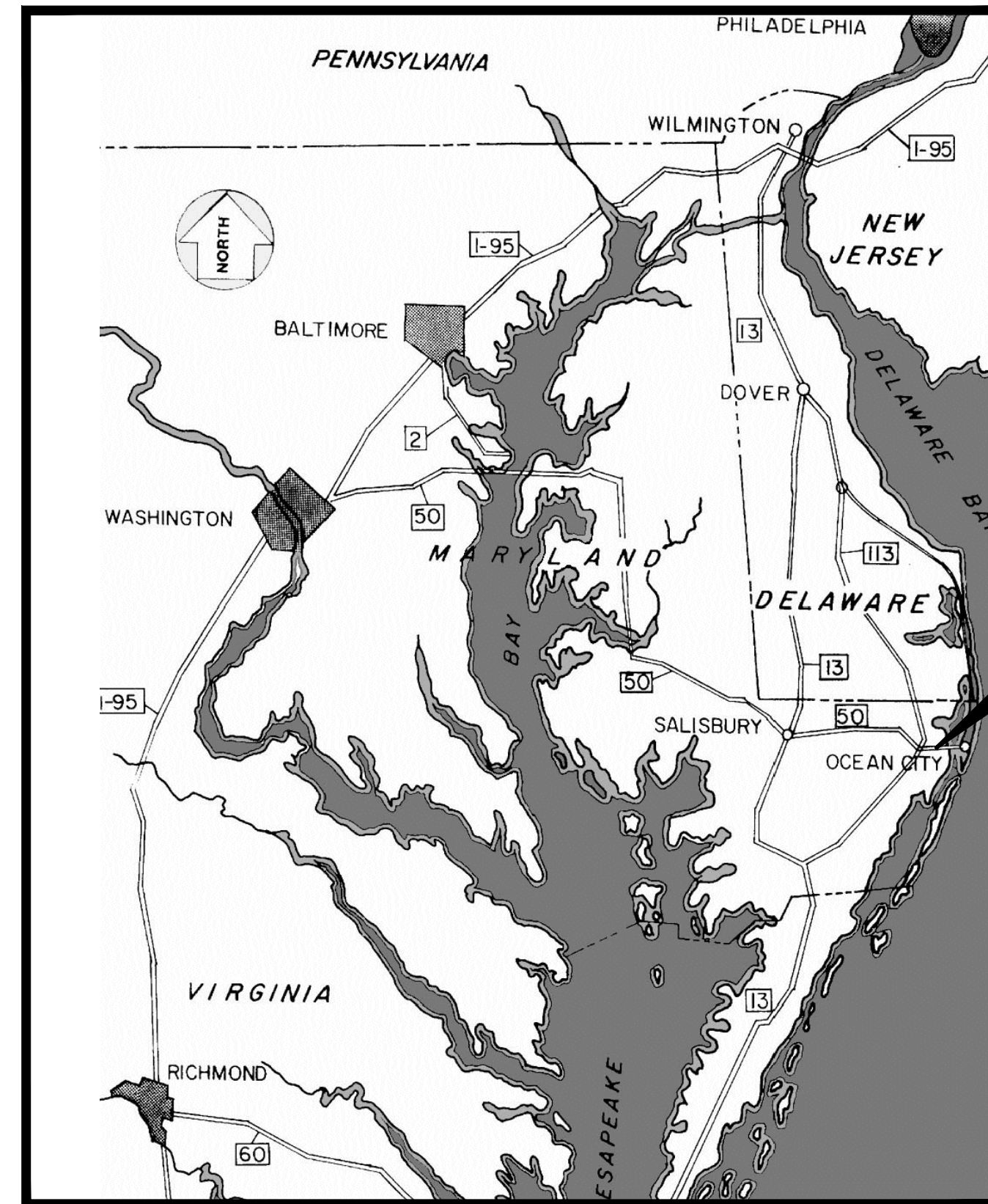
Q-1.0 WASTEWATER BUILDING DEMOLITION PLAN
Q-1.1 WASTEWATER BUILDING DEMOLITION TOP PLAN
Q-2.0 WASTEWATER BUILDING DEMOLITION SECTIONS A AND B
Q-2.1 WASTEWATER BUILDING DEMOLITION SECTION C
Q-2.2 WASTEWATER BUILDING MODIFICATION SECTIONAL PLAN
Q-2.3 WASTEWATER BUILDING MODIFICATION TOP PLAN
Q-2.4 WASTEWATER BUILDING MODIFICATION SECTIONS A AND B
Q-2.5 WASTEWATER BUILDING MODIFICATION SECTION C
Q-2.6 WASTEWATER BUILDING MODIFICATION SECTIONS D AND E
Q-2.7 WASTEWATER BUILDING MODIFICATION SECTION F
Q-3.0 WASTE BACKWASH SETTLING TANK
Q-3.1 WASTE BACKWASH PUMPING STATION

STRUCTURAL

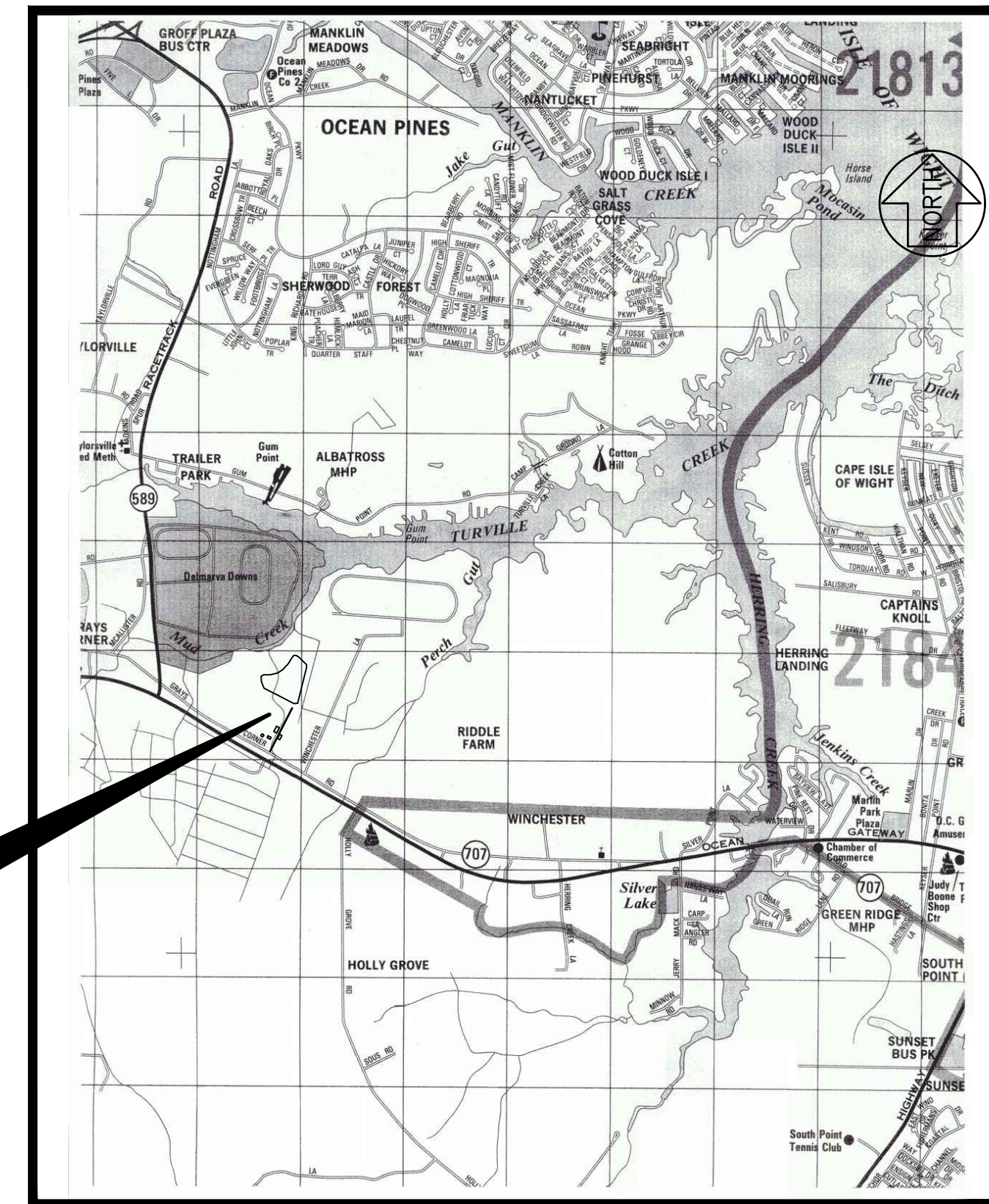
S-1.1 PLAN, ELEVATIONS, AND NOTES
S-2.1 SECTIONS AND DETAILS

ELECTRICAL

E-1 LEGEND
E-2 WWTP BUILDING PLAN - ELECTRICAL
E-3 WTP BUILDING PLAN - ELECTRICAL
E-4 WASTE BACKWASH SETTLING TANK - ELECTRICAL
E-5 DETAILS - ELECTRICAL
E-6 SINGLE LINE DIAGRAM - ELECTRICAL
E-7 SINGLE LINE DIAGRAM - ELECTRICAL
E-8 INTERCONNECT DIAGRAM - ELECTRICAL
E-9 SCHEDULES - ELECTRICAL



VICINITY MAP
1" = 20 MILES



LOCATION MAP
1" = 2000'

RIDDLE FARM

PROJECT SITE

THE WATER AND/OR SEWER FACILITIES TO BE
CONSTRUCTED IN ACCORDANCE WITH THESE PLANS
ARE APPROVED BY WORCESTER COUNTY
WATER AND WASTEWATER SERVICES

[Signature]
DIRECTOR
WO. CO. WATER & WASTEWATER SERVICES

THE WATER AND/OR SEWER FACILITIES TO BE
CONSTRUCTED IN ACCORDANCE WITH THESE PLANS
ARE APPROVED BY WORCESTER COUNTY
DEPARTMENT OF PUBLIC WORKS

[Signature]
DIRECTOR
WO. CO. DEPARTMENT OF PUBLIC WORKS

GMB
GEORGE, MILES & BUHR, LLC
ARCHITECTS & ENGINEERS
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SEPTEMBER 2023

DATE	
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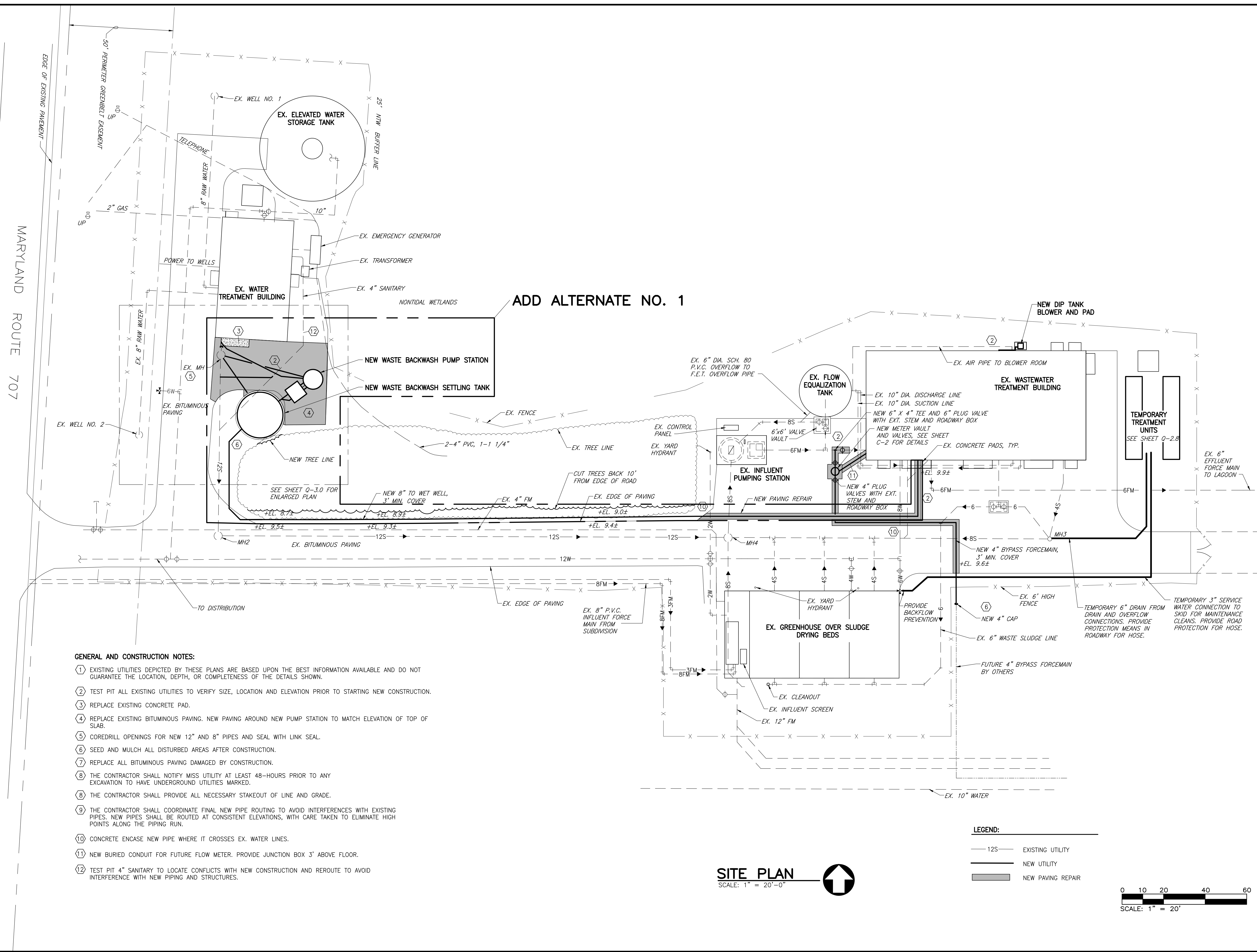
RIDDLE FARM WWTP
 EQUIPMENT UPGRADES
 WORCESTER COUNTY, MARYLAND



SITE PLAN

SCALE: AS SHOWN SHEET NO.
 DESIGN BY: CSD
 DRAWN BY: MMD
 CHECKED BY: PAB
 SMB FILE: 220047
 DATE: SEPTEMBER 2023

C-1

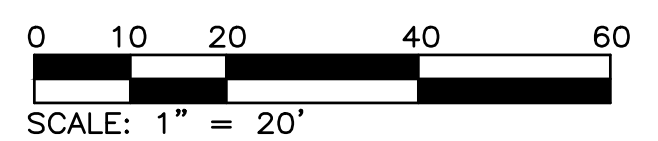


- GENERAL AND CONSTRUCTION NOTES:**
- EXISTING UTILITIES DEPICTED BY THESE PLANS ARE BASED UPON THE BEST INFORMATION AVAILABLE AND DO NOT GUARANTEE THE LOCATION, DEPTH, OR COMPLETENESS OF THE DETAILS SHOWN.
 - TEST PIT ALL EXISTING UTILITIES TO VERIFY SIZE, LOCATION AND ELEVATION PRIOR TO STARTING NEW CONSTRUCTION.
 - REPLACE EXISTING CONCRETE PAD.
 - REPLACE EXISTING BITUMINOUS PAVING. NEW PAVING AROUND NEW PUMP STATION TO MATCH ELEVATION OF TOP OF SLAB.
 - COREDRIILL OPENINGS FOR NEW 12" AND 8" PIPES AND SEAL WITH LINK SEAL.
 - SEED AND MULCH ALL DISTURBED AREAS AFTER CONSTRUCTION.
 - REPLACE ALL BITUMINOUS PAVING DAMAGED BY CONSTRUCTION.
 - THE CONTRACTOR SHALL NOTIFY MISS UTILITY AT LEAST 48-HOURS PRIOR TO ANY EXCAVATION TO HAVE UNDERGROUND UTILITIES MARKED.
 - THE CONTRACTOR SHALL PROVIDE ALL NECESSARY STAKEOUT OF LINE AND GRADE.
 - THE CONTRACTOR SHALL COORDINATE FINAL NEW PIPE ROUTING TO AVOID INTERFERENCES WITH EXISTING PIPES. NEW PIPES SHALL BE ROUTED AT CONSISTENT ELEVATIONS, WITH CARE TAKEN TO ELIMINATE HIGH POINTS ALONG THE PIPING RUN.
 - CONCRETE ENCASE NEW PIPE WHERE IT CROSSES EX. WATER LINES.
 - NEW BURIED CONDUIT FOR FUTURE FLOW METER. PROVIDE JUNCTION BOX 3' ABOVE FLOOR.
 - TEST PIT 4" SANITARY TO LOCATE CONFLICTS WITH NEW CONSTRUCTION AND REROUTE TO AVOID INTERFERENCE WITH NEW PIPING AND STRUCTURES.

SITE PLAN
 SCALE: 1" = 20'-0"

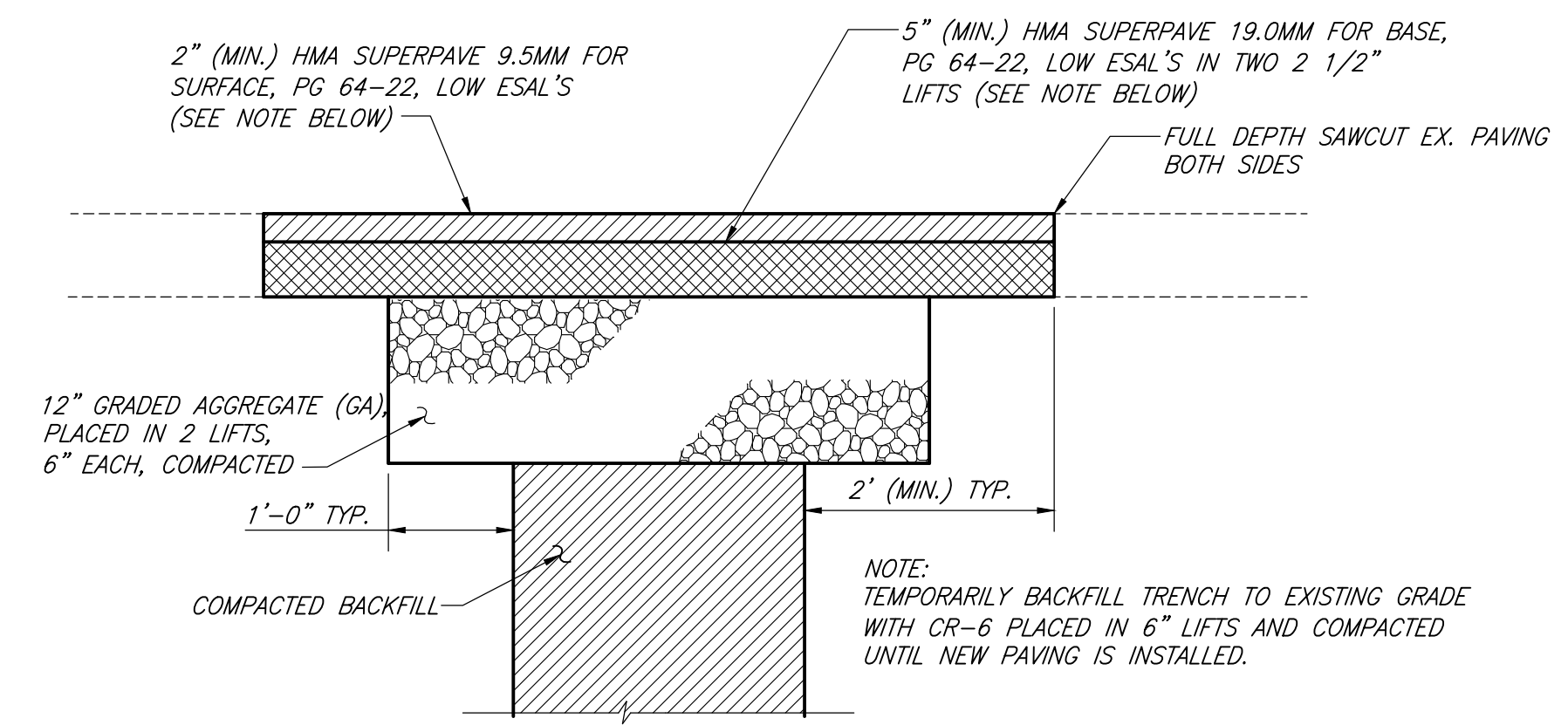
LEGEND:

— 12S —	EXISTING UTILITY
—	NEW UTILITY
■	NEW PAVING REPAIR

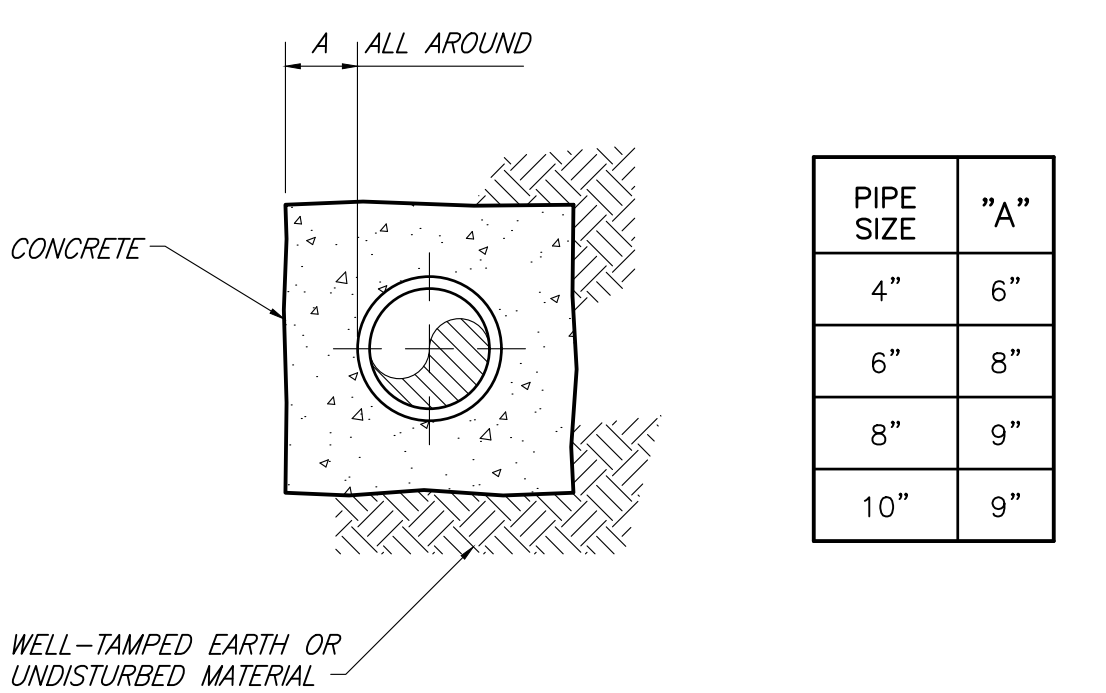


PLOT CODE PENN-DWG 024 INCHES (50mm)
 PENS-BLUE 020 INCHES (50mm)
 PENS-MAGENTA 027 INCHES (70mm)
 PENS-BLACK 027 INCHES (70mm)
 PENS-YELLOW 027 INCHES (70mm)
 PENS-RED 026 INCHES (65mm)

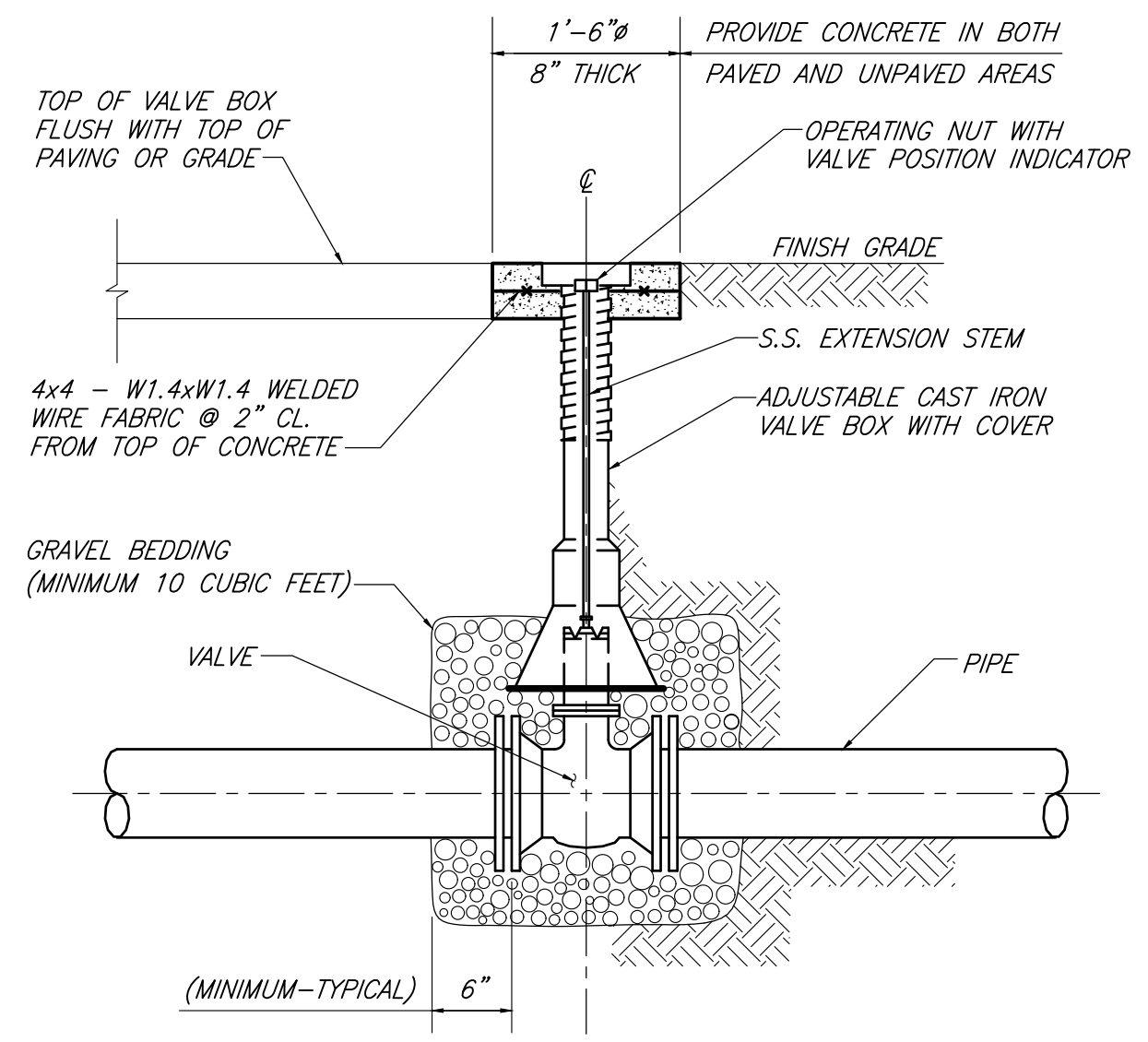
DATE	
REVISIONS	
NO.	



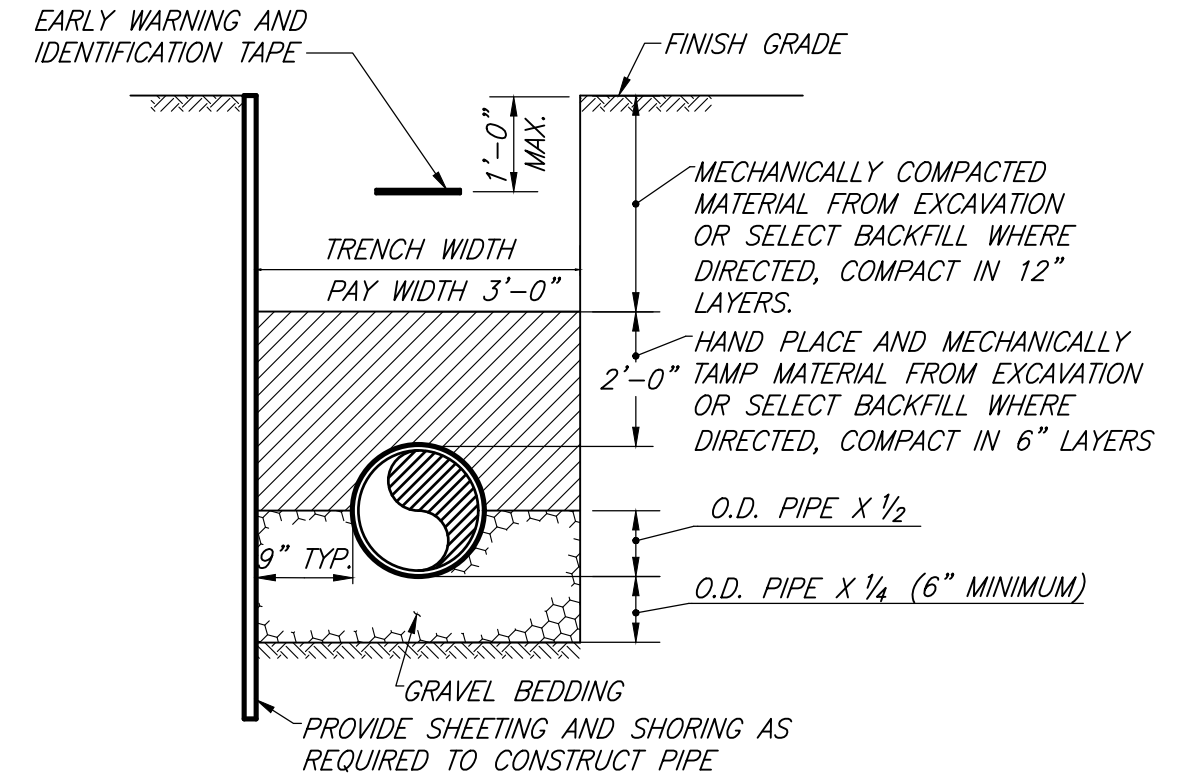
BITUMINOUS PAVING REPAIR (PR)
NOT TO SCALE



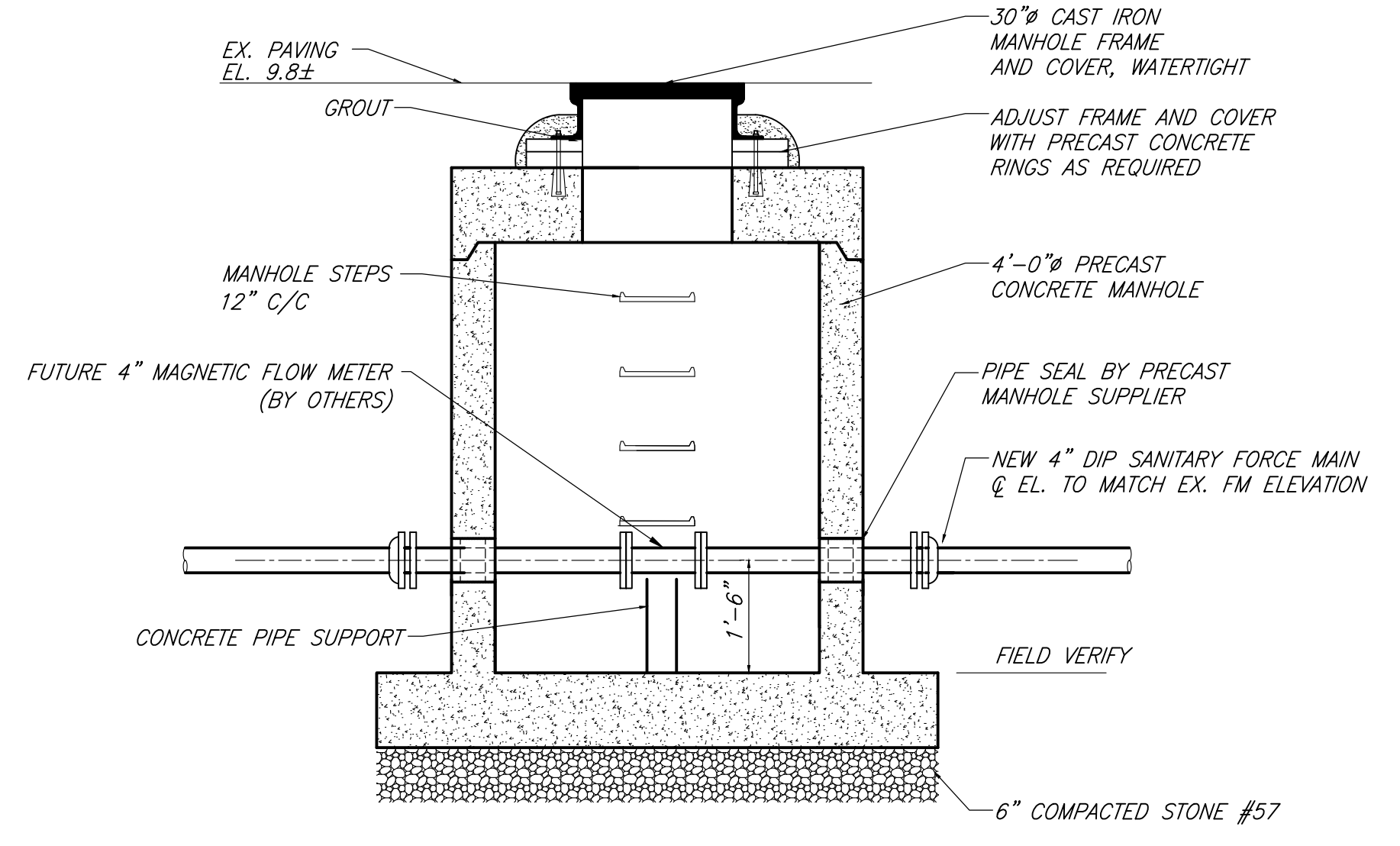
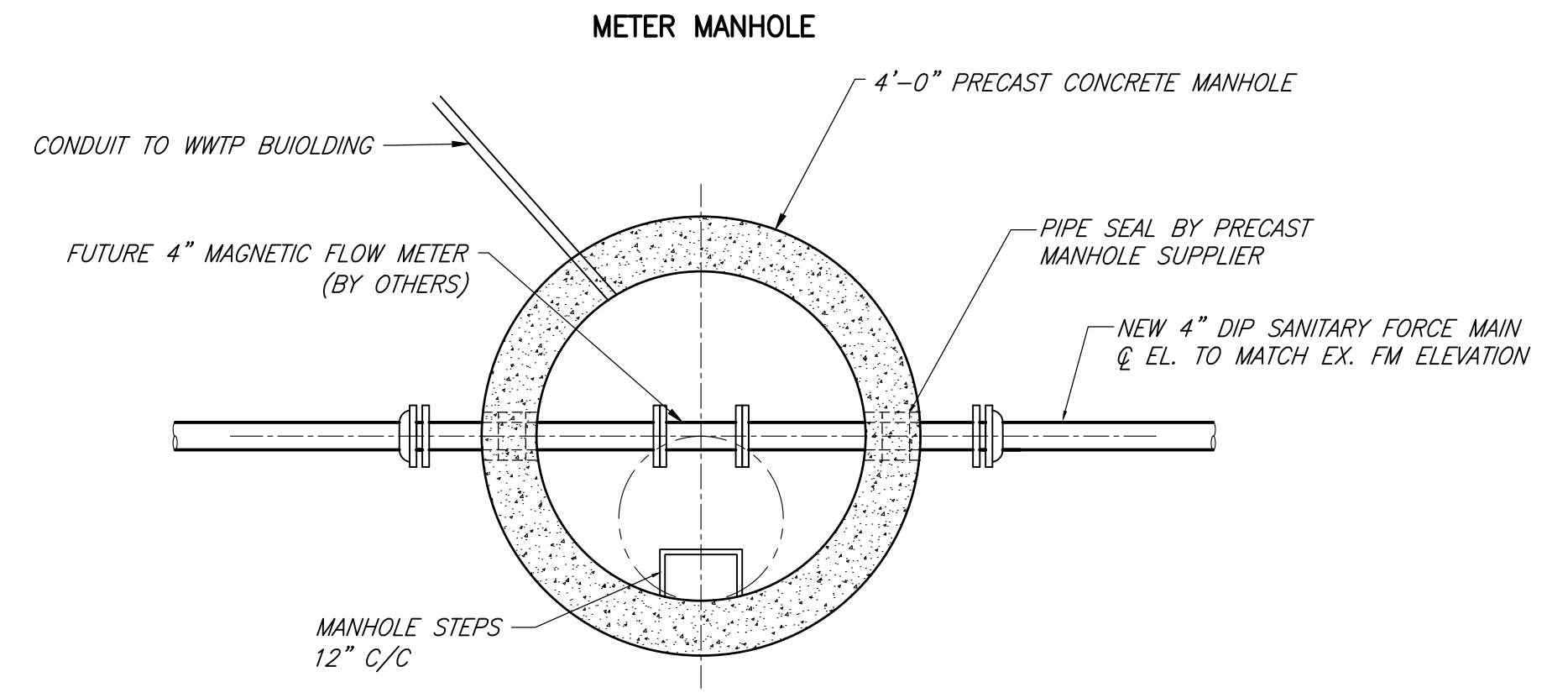
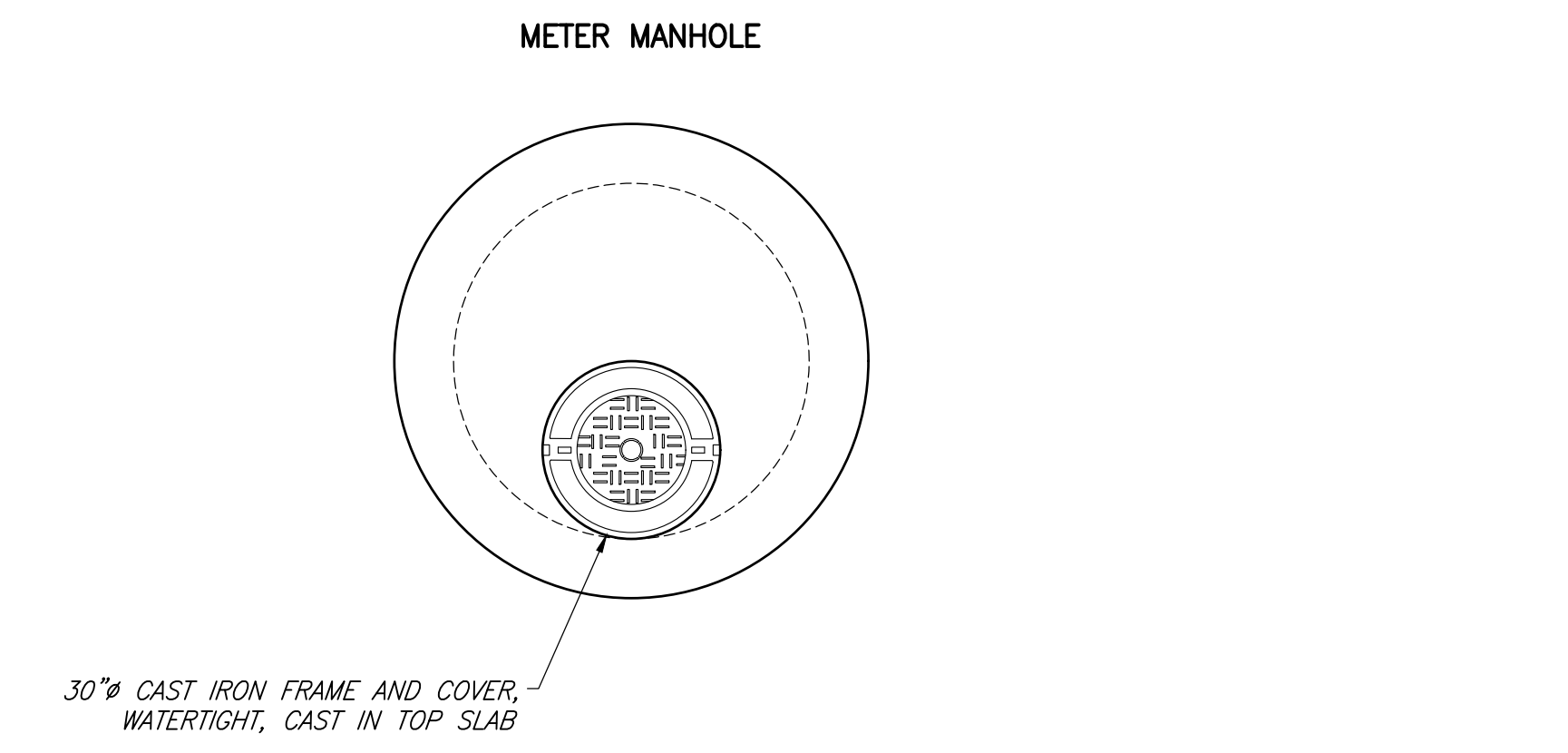
CONCRETE ENCASEMENT (CE)
NOT TO SCALE



VALVE BOX DETAIL (VB)
NOT TO SCALE



PIPE TRENCH (PT)
NOT TO SCALE



SECTIONAL ELEVATION METER VAULT
NOT TO SCALE

PLOT CODE: PEN-BLUE (200 INCHES (50mm))
PEN-RED (200 INCHES (50mm))
PEN-YELLOW (207 INCHES (53mm))
PEN-ORANGE (200 INCHES (50mm))
PEN-GREEN (200 INCHES (50mm))
PEN-BROWN (207 INCHES (53mm))
PEN-MAGENTA (207 INCHES (53mm))
PEN-WHITE (207 INCHES (53mm))

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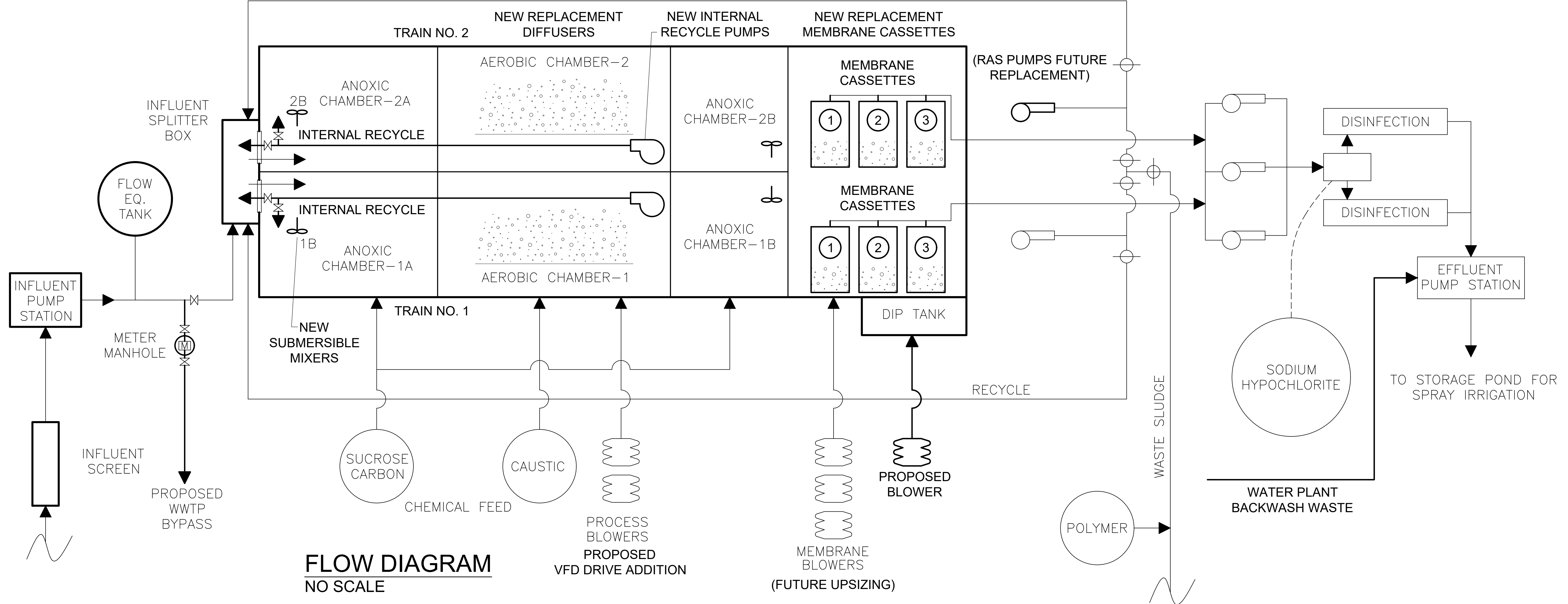
RIDDLE FARM WWTP
EQUIPMENT UPGRADES
WORCESTER COUNTY, MARYLAND



SITE DETAILS

SCALE: AS SHOWN	SHEET NO.
DESIGN BY: CBD	C-2
DRAWN BY: MMD	
CHECKED BY: PAB	
GMB FILE: 220047	
DATE: SEPTEMBER 2023	

RAS & MEMBRANE RECYCLE



FLOW DIAGRAM
NO SCALE

DESIGN CRITERIA

1. FLOW AND WASTEWATER CHARACTERISTICS:

PARAMETER	INFLUENT	EFFLUENT
FLOW-AVERAGE (MGD)	0.277	0.277
FLOW-PEAK (MGD)	0.555	0.555
BOD ₅ (MG/L)	200	10
TOTAL SUSPENDED SOLIDS (MG/L)	200	5
TOTAL NITROGEN (MG/L)	40	5
TOTAL PHOSPHOROUS (MG/L)	N/A	N/A
TEMPERATURE (DEGREES C)	10	10

2. INFLUENT SCREENING:

SCREEN TYPE	ROTARY MECHANICAL SCREEN
OPENING SIZE	1 MM
CHANNEL DIAMETER	2.0 FT

3. RAW SEWAGE PUMPING:

LOCATION	INFLUENT PUMPING STATION
NUMBER OF UNITS	2 (LEAD-LAG)
MAX. UNIT CAPACITY	573 GPM @ 99.52 FT
TYPE	SUBMERSIBLE NON-CLOG
MOTOR	25 HP
DRIVE	VARIABLE FREQUENCY DRIVE

4. FLOW EQUALIZATION:

TANKS	STAINLESS STEEL
EQUALIZATION VOLUME	216,000 GALLONS
PERCENT OF DESIGN FLOW	77%
MIXING	JETMIX / AERATION

5. ZENON MEMBRANE BIOREACTOR (MBR):

TOTAL MEMBRANE SURFACE AREA, SQUARE FEET (SF)		
FLUX RATE, GALLONS PER SQ. FT. PER DAY (GFD)		
AVG. DAY	MAX. MONTH	MAX. DAY
30,960	30,960	30,960
8.97	10.85	18.09

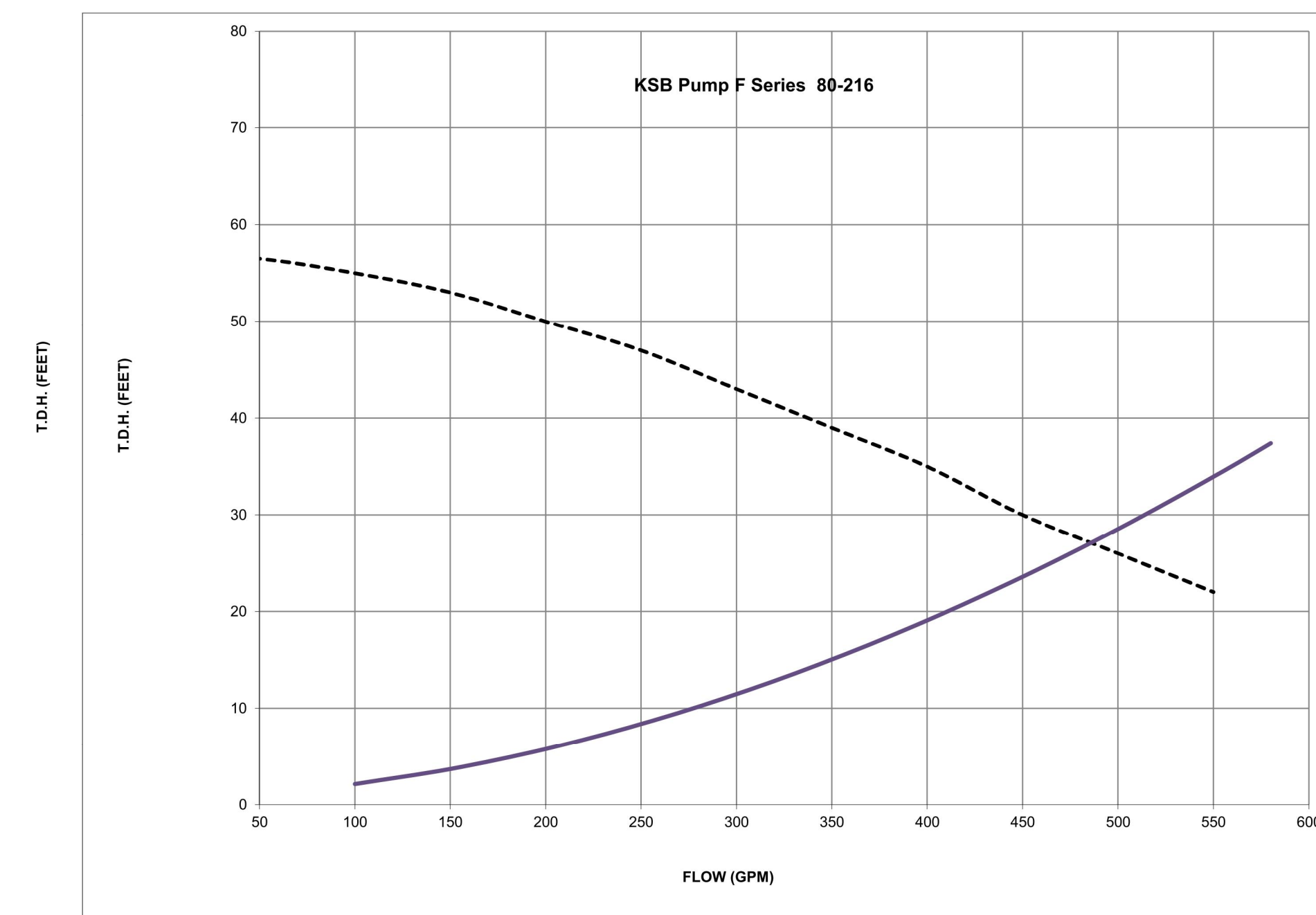
6. DISINFECTION:

NO. OF TRAINS	2
TANK VOLUME	13,000 GAL.
DETENTION TIME	30 MIN. @ PEAK FLOW BASED UPON MAX. PUMP RATE (2 X 225 GPM)

CHLORINE DOSAGE	4-5 MG/L
CHLORINE CHEMICAL SOLUTION	12% SODIUM HYPOCHLORITE
SOLUTION FEED RATE	6-8 GALLONS PER DAY

7. SLUDGE PROCESSING:

SLUDGE PRODUCTION	SEE SHEET C-4	0.4 LBS. / LBS BOD REMOVED
DRYING BEDS	COVERED - POROUS PAVED 3 CELLS	2,690 SF TOTAL



INTERNAL RECYCLE PUMP / SYSTEM CURVE

PRINTS ISSUED FOR:
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RIDDLE FARM WWTP
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WORCESTER COUNTY, MARYLAND



FLOW DIAGRAM

SCALE	AS NOTED	SHEET NO.
DESIGN BY	CBG	C-3
DRAWN BY	MMD	
CHECKED BY	CBG	
GMB FILE	220047	
DATE	SEPTEMBER 2022	

DESIGN VALUES FOR 0.277 mgd PERMITTED FLOW

Flow Characteristics		Default Values	Flow Condition:		
			ADF	MMF	MDF
Average Day	US Gal/d		277,750		
Max Month	US Gal/d		336,000		
Max Week	US Gal/d		336,000		
Max Day	US Gal/d		560,000		
Peak Hour (total influent)	US Gal/d		560,000		
Biological Design Basis					
Kinetic design based on:		Max Month	Average Day	Max Month	Max Day
		US Gal/d	277,750	336,000	560,000
Wastewater Characteristics					
Concentrations					
BOD5	mg/L		200		
TSS	mg/L		200		
ISS	mg/L		40.0		
TKN	mg/L		40.0		
TP	mg/L		8.0		
Alkalinity	mg/L		150		
Minimum Water Temperature	°C		10.0		
Daily Loads					
BOD5	Lb/d		467.34	560.81	934.68
TSS	Lb/d		467.34	560.81	934.68
ISS	Lb/d		93.47	112.16	186.94
TKN	Lb/d		93.47	112.16	186.94
TP	Lb/d		18.69	22.43	37.39
Biological Configuration					
C:N ratio	mg BOD / mg TKN		5.00		
Nitrogen removal from influent to effluent			88%		
Effluent total nitrogen target	mg/L		5.00		
Effluent ammonia target	mg/L		0.40		
Biological configuration		View Biological Configurations	4.00	+ Aerobic + Post-Anoxic, + Aerobic + Post-Anoxic,	
Selected biological configuration			4.00		
Design Aerobic SRT Target					
Note: SRTs listed here are aerobic SRTs, and include inerts and coagulant solids					
Recommended aerobic SRT target	days		16.00		
Aerobic SRT Safety Factor - (now replaces Aerobic Volume SF)	days		1.28		
Selected aerobic SRT target for design	days		20.52		
Process Parameters					
ZeeWeed MLSS at selected flow	mg/L		10,000	10,000	12,000
Design bioreactor MLSS	mg/L	8,000	8,000	8,000	8,000
Percent volatile solids	MLVSS/MLSS		72%	72%	72%
Biological sludge yield based on target SRT	kg VSS produced/kg BOD treated/day	0.40	40%	40%	40%
Calculated Biological sludge yield			36%	40%	48%
Tank Volumes					
Split of anoxic volume between pre-anoxic and post-anoxic		pre-anoxic	0.60		
		post-anoxic	0.40		
Pre-Anoxic Volume					
Pre-anoxic volume safety factor		1.15	1.52		
Pre-Anoxic Volume	US Gal	31,544	47,789		
Aerobic Volume					
Aerobic Volume	US Gal	63,806	63,806		
Post-Anoxic Volume					
Post-anoxic volume safety factor		1.15	1.14		
Post-Anoxic Volume	US Gal	21,029.29	23,889		
Pre-anoxic volume	US Gal		47,789		
Post-anoxic volume	US Gal		23,889.27		
Total anoxic volume	US Gal		71,678		
Aerobic volume	US Gal		63,806		
Membrane tank volume	US Gal		47,211		
Total aerobic volume	US Gal		111,017		
Total overall plant volume	US Gal		182,696		
Anoxic volume percentage			39%		
Hydraulic Retention Time (at Average Day Flow)					
Pre-anoxic tank HRT	hours		4.10		
Post-anoxic tank HRT	hours		2.05		
Total anoxic HRT	hours		6.14		
Supplementary aerobic tank HRT	hours		5.47		
Membrane tank HRT	hours		4.05		
Total aerobic (including membranes) HRT	hours		9.52		
Total HRT	hours		15.7		
MEMBRANE AREA AND FLUX RATE					
			AVG DAY	MAX. MONTH	MAX DAY
TOTAL MEMBRANE SURFACE AREA	SQUARE FEET		30,960	30,960	30,960
FLUX RATE	GFD		8.97	10.85	18.09

Process Rates (at Average Day Flow)			
Reference F:M ratio	kg BOD5 / kg MLVSS / day		0.10
Aerobic F:M ratio	kg BOD5 / kg MLVSS / day		0.08
Anoxic F:M ratio	kg BOD5 / kg MLVSS / day		0.14
Combined F:M ratio	kg BOD5 / kg MLVSS / day		0.05
Effective nitrification rate	kg NH3 oxidized / kg MLVSS / d		0.01
Denitrification rate	kg NO3-N / kg MLVSS / d		0.03
Calculated minimum anoxic volume to achieve required [NO ₃]	US Gal		43,811
Net Sludge Generation (at Average Day Flow)			
Total MLSS in the system	Lb.		12,985
Biological sludge wasting rate	Lb./d		239.53
Inert suspended solids wasting rate	Lb./d		93.47
Chemical precipitate sludge wasting rate	Lb./d		0.00
Total sludge wasting rate	Lb./d		333.00
	(assuming wasting from membrane tanks)	US Gal/d	3,990
Total SRT (including biomass + ISS + chemical precipitate)	days		39.0
Aerobic SRT	days		24.62
Nutrient Removal			
N Removed by Waste			
% Nitrogen (MLVSS)			8%
Nitrogen (Lb./d)		23.00	38.33
Nitrogen (mg/L)		8.20	8.20
P Biologically removed			
% Phosphorus (MLVSS)			2%
Phosphorus (Lb./d)		4.31	7.19
Phosphorus (mg/L)		1.54	1.54
Calculated NO3-N in effluent			
Recirculation Rate From Membranes To Bioreactor			4.00
Process circulation	Qt=Qr + Qi		1,400,000
Minimum achievable effluent NO3-N concentration based on Recirc Rate			6.36
Assumed non-biodegradable TKN concentration	0.80		10.60
Maximum allowable effluent NO3-N concentration to achieve TN goal			2%
			3.80
Mixed Liquor Recycle 2 (from Aerobic to Pre-Anoxic)			
Recycle 2 recirculation ratio	2.50	Q	2.50
Air Requirements (at Average Day Flow)			
Biological Oxygen Requirements			
BOD5 Treated in Aerobic Process	Lb./d		467.34
NH3-N Nitrified in Aerobic Process	Lb./d		71.50
Oxygen Required for BOD5	Lb. O2 / Lb. BOD5	1.25	1.25
Oxygen Required for Nitrification	Lb. O2 / Lb. NH3	4.60	4.60
Oxygen Required for BOD5	Lb./d		584.17
Oxygen Required for Nitrification	Lb./d		328.90
Denitrification O2 Credit	Lb./d		179.10
Total System Actual Oxygen Requirement (AOR)	Lb./d		733.98
Process Aeration Requirements			
Supplemental Aeration Required (Total System AOR - AOS by membrane aeration)	Lb./d		733.98
Fine Bubble Alpha Factor			0.54
Beta			0.95
Temp	(68 °F)		20.00
Temperature Correction Factor (1.024^(T-20))			1.00
Site Elevation	ft (assumed)		0.00
Pressure @ mean sea level (Pmsl)	psi		14.69
Pressure at actual elevation (P)	psi		14.70
Aerobic Tank Water Depth	ft	18.04	18.04
Fine Bubble Submergence	ft		17.04
Saturation Concentration @ design temperature (Csw)			9.09
Saturation Concentration @ 20C @ standard conditions (Cs)			9.09
DO in Aerobic Bioreactor Zone	mg/L		2.00
AOTE/SOTE = Alpha x ((Beta(Csw)-DO)/Cs) x Temp Correction			0.39
Assumed SOTE per metre submergence for fine bubble aeration	(2.00 % / foot)		6.56
Assumed Standard Oxygen Transfer Efficiency (SOTE)	%		34.08
Actual Oxygen Transfer Efficiency (AOTE)	%		13.43
Supplemental Aeration Safety Factor			1.25
Supplemental Aeration Required	scfm @ 20°C		272
Approximate Discharge Pressure (for Operating Costs)	psig		8.83
Mixing Air Requirements:	scfm @ 20°C		127.95
Oxygen Uptake Rates			
Supplemental Oxygen Uptake Rate	mg/L/hr		57.43
Membrane Oxygen Uptake Rate	mg/L/hr		58.24

PRINTS ISSUED FOR: BID SET

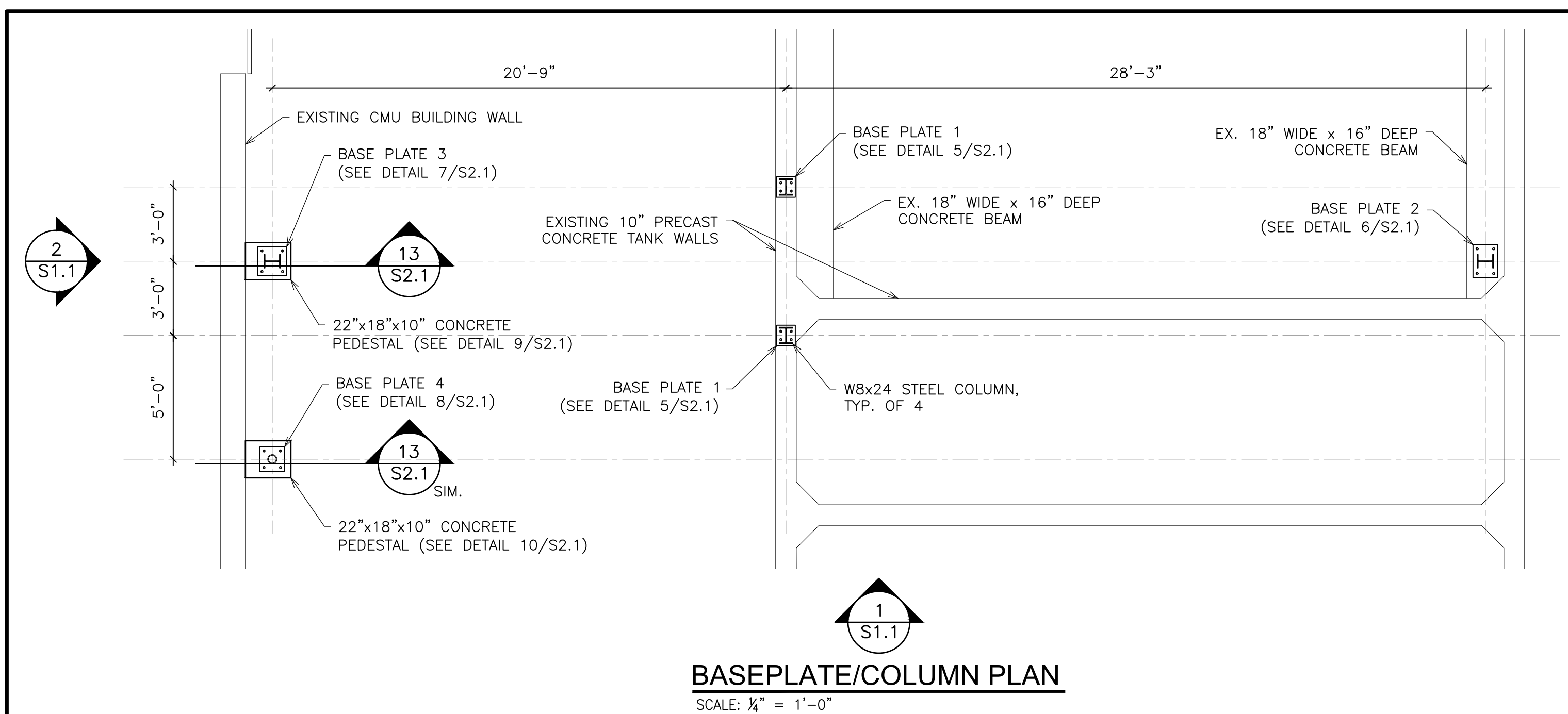
DATE	REVISIONS	NO.

RIDDLE FARM WWTP EQUIPMENT UPGRADES WORCESTER COUNTY, MARYLAND

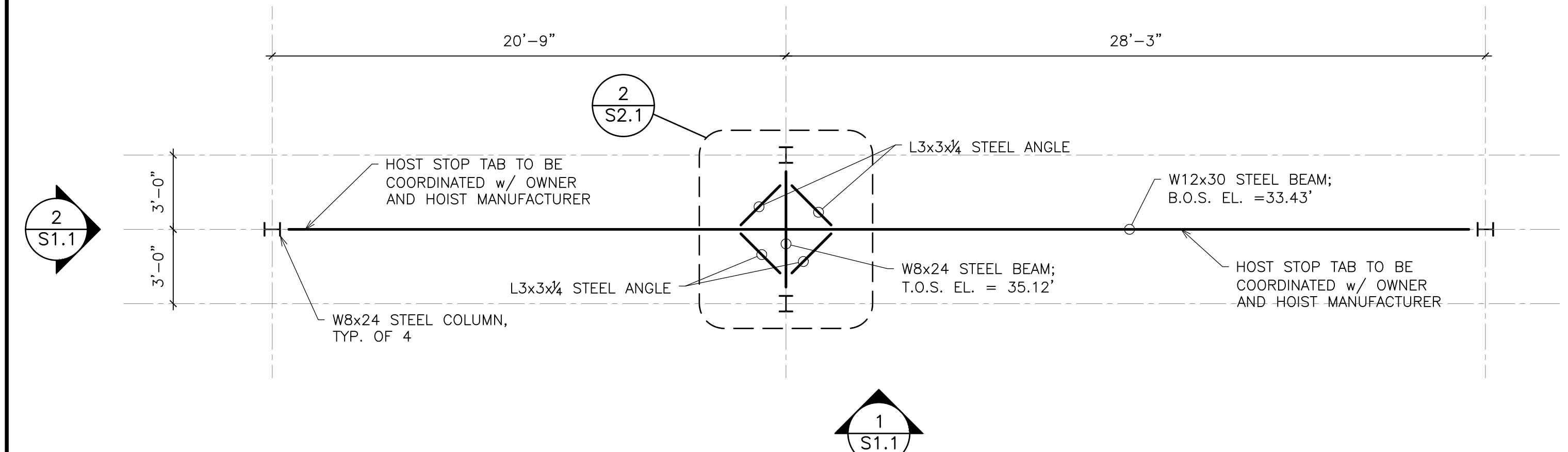


DESIGN VALUES FOR 0.277 MGD PERMITTED FLOW

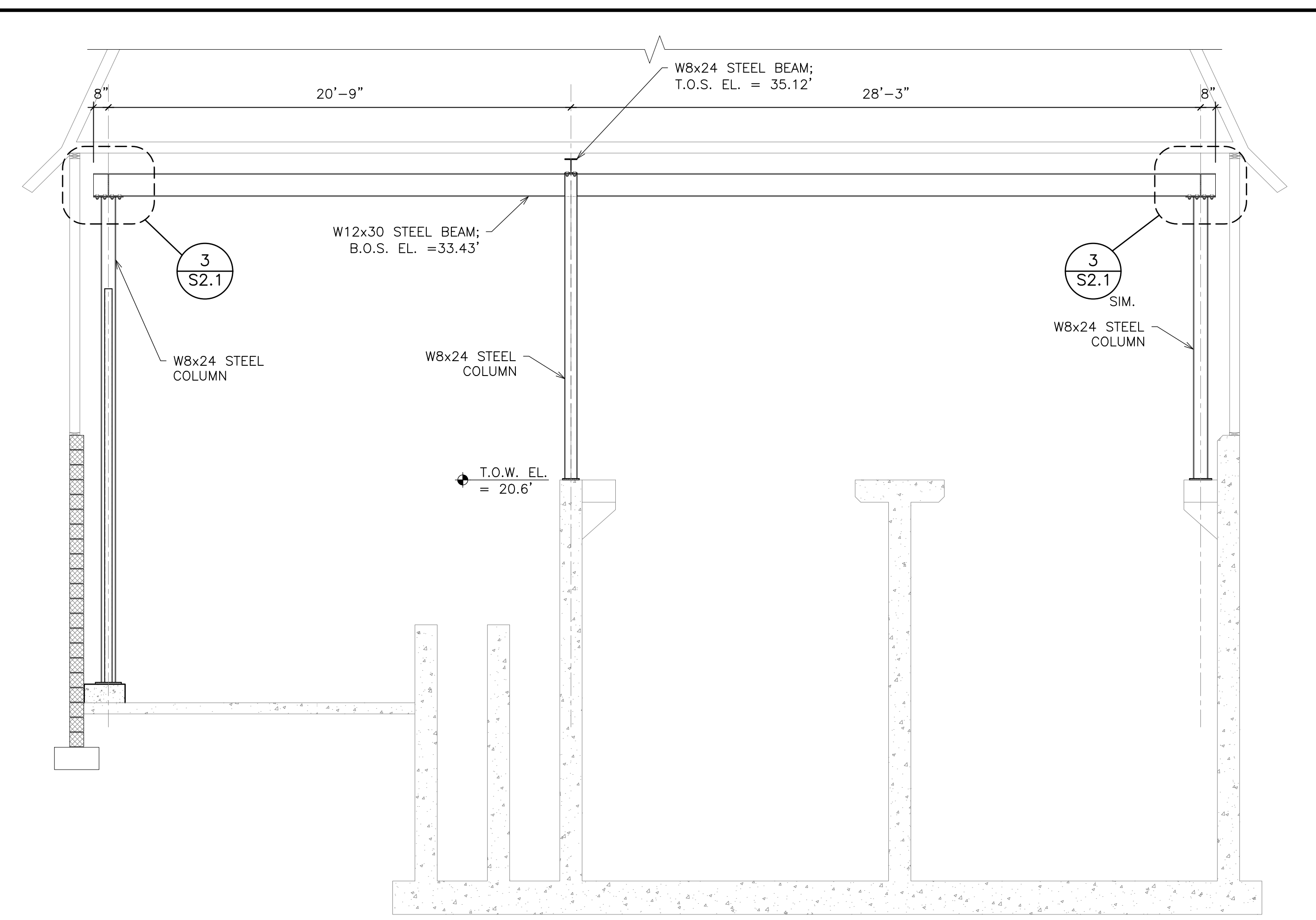
SCALE : AS SHOWN	SHEET NO.
DESIGN BY : CBD	C-4
DRAWN BY : MMD	
CHECKED BY : PAB	
GMB FILE : 220047	
DATE : SEPTEMBER 2023	



BASEPLATE/COLUMN PLAN
SCALE: 1/4" = 1'-0"



UPPER LEVEL STEEL FRAMING PLAN
SCALE: 1/4" = 1'-0"



ELEVATION 1
SCALE: 1/4" = 1'-0"

GOVERNING CODES

THE FOLLOWING CODES AND STANDARDS, INCLUDING ALL SPECIFICATIONS REFERENCED WITHIN, SHALL APPLY TO THE DESIGN, CONSTRUCTION, QUALITY CONTROL AND SAFETY OF ALL WORK PERFORMED ON THE PROJECT. USE THE LATEST EDITIONS (U.N.O.).

A. "INTERNATIONAL BUILDING CODE", INTERNATIONAL BUILDING CODE COUNCIL, INC., 2018.
 B. "MINIMUM DESIGN LOADS FOR BUILDINGS AND OTHER STRUCTURES" (ANSI/ASCE 7-16), AMERICAN SOCIETY OF CIVIL ENGINEERS.

THE STRUCTURAL INTEGRITY OF THE STRUCTURE IS DEPENDANT UPON COMPLETION ACCORDING TO PLANS AND SPECIFICATIONS. THE STRUCTURAL ENGINEER ASSUMES NO LIABILITY FOR THE STRUCTURE DURING CONSTRUCTION. THE METHOD OF CONSTRUCTION AND SEQUENCE OF OPERATIONS IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR SHALL SUPPLY ANY NECESSARY SHORING, BRACING, GUYS, ETC., TO PROPERLY BRACE THE STRUCTURE AGAINST WIND, DEAD AND LIVE LOADS UNTIL THE BUILDING IS COMPLETED ACCORDING TO THE PLANS AND SPECIFICATIONS. ANY QUESTIONS REGARDING TEMPORARY SHORING REQUIREMENTS SHOULD BE FORWARDED TO THE STRUCTURAL ENGINEER FOR REVIEW. MECHANICAL UNITS AND ANY OTHER EQUIPMENT SUPPORTED BY THE STRUCTURE WITH WEIGHTS IN EXCESS OF 200 LBS. SHALL BE BROUGHT TO THE ATTENTION OF THE STRUCTURAL ENGINEER PRIOR TO INSTALLATION.

STRUCTURAL STEEL

FABRICATION AND ERECTION OF STRUCTURAL STEEL SHALL CONFORM WITH THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION, (AISC) "MANUAL OF STEEL CONSTRUCTION".

THE CONTRACTOR SHALL SUBMIT ERECTION PLANS AND SHOP DETAILS BEFORE PROCEEDING WITH FABRICATION.

ALL STRUCTURAL STEEL I BEAMS SHALL CONFORM TO ASTM A992 GRADE 50 (50 KSI).
 STRUCTURAL PIPE SHALL CONFORM TO ASTM A53 GRADE B.

ANCHOR BOLTS (A.B.) SHALL COMPLY WITH ASTM F1554 GRADE 36.
 HIGH STRENGTH BOLTS (HS) SHALL COMPLY WITH ASTM A325N.

ALL WELDING SHALL COMPLY WITH AMERICAN WELDING SOCIETY, (AWS D1.1) "STRUCTURAL WELDING CODE" LATEST EDITION.

ALL SHOP CONNECTIONS SHALL BE WELDED WITH CLASS E-70 SERIES ELECTRODES. FIELD CONNECTIONS SHALL BE HIGH STRENGTH BOLTED, EXCEPT WHERE OTHERWISE NOTED.

CONNECTIONS NOT INDICATED, SHALL BE DESIGNED BY THE FABRICATOR. BEAM CONNECTIONS SHALL BE DESIGNED FOR ONE-HALF THE TOTAL ALLOWABLE UNIFORM LOAD, GIVEN IN PART 2 OF THE AISC "MANUAL OF STEEL CONSTRUCTION." OTHER CONNECTIONS SHALL BE DESIGNED FOR THE LOADS INDICATED. ALL CONNECTIONS SHALL BE A MINIMUM OF TWO 3/4" H.S. BOLTS OR WELDS OF EQUAL STRENGTH.

MILL BOTTOM OF ALL COLUMNS AND FINISH TOP OF ALL BASE PLATES IN ACCORDANCE WITH A.I.S.C. SPECIFICATIONS. BASE PLATES SHALL BE WELDED TO BOTTOM OF COLUMNS.

SPECIFIED GROUT THICKNESS INCLUDES 1/4" THICK LEVELING PLATES WHICH SHALL BE USED UNDER ALL BEAMS AND COLUMNS RESTING ON CONCRETE.

ALL STEEL SHAPES SHALL BE SHOP PRIMED AND PAINTED PER SPECIFICATIONS.

CAST-IN-PLACE CONCRETE

ALL CONCRETE SHALL BE MADE IN ACCORDANCE WITH DESIGN MIXES WHICH ARE TO BE APPROVED BY THE ARCHITECT OR ENGINEER PRIOR TO CASTING ANY CONCRETE. MIXES SHALL BE IN ACCORDANCE WITH THE AMERICAN CONCRETE INSTITUTION ACI 318. MIXES SHALL HAVE A MINIMUM CEMENT CONTENT OF 520 LB. PER CUBIC YD., MAXIMUM WATER/CEMENT RATIO OF 0.45 FOR ALL EXTERIOR EXPOSED CONCRETE.

MINIMUM SPECIFIED COMPRESSIVE STRENGTH f'_c @ 28 DAYS.

LOCATION	MIN. COMP. (F°C)	SLUMP (IN.)
PEDESTALS	4000 PSI	4" +/- 1"

CONCRETE MATERIALS SHALL CONFORM TO ASTM C150, TYPE I FOR PORTLAND CEMENT AND ASTM C33 FOR AGGREGATES. WATER-REDUCING ADMIXTURES SHALL CONFORM TO ASTM C494, TYPE A (FREE OF CALCIUM CHLORIDES), AIR-ENTRAINING ADMIXTURES SHALL CONFORM TO ASTM C260, AND HIGH-RANGE WATER REDUCERS (SUPER-PLASTICIZERS) SHALL CONFORM TO ASTM C494, TYPE F. FLY ASH SHALL COMPLY WITH ASTM C619 FOR CLASS F AND SHALL NOT BE PROPORTIONED IN MIXES WITH MORE THAN 20% CEMENT BY WEIGHT. LIQUID-MEMBRANE CURING COMPOUNDS SHALL BE HIGH-SOLIDS, WATER AND ACRYLIC-BASED, COMPLYING WITH ASTM C309 AS TESTED UNDER ASTM C156.

ALL EXTERIOR CONCRETE AND CONCRETE EXPOSED TO WEATHER SHALL BE AIR-ENTRAINED (5% +/- 1%). USE OF ADDITIVES SHALL NOT BE PERMITTED UNLESS SPECIFICALLY APPROVED BY THE STRUCTURAL ENGINEER. USE OF ADDITIVES CONTAINING CALCIUM CHLORIDE SHALL NOT BE PERMITTED. DO NOT USE HIGH-RANGE WATER REDUCING ADMIXTURES IN AIR-ENTRAINED CONCRETE. CONFORM TO ASTM C260.

ADDITION OF WATER TO THE CONCRETE AT THE JOB SITE FOR THE PURPOSE OF INCREASING THE SLUMP OR FOR RETEMPERING THE CONCRETE WHICH HAS BEGUN TO SET IS STRICTLY PROHIBITED. SEE THE PROJECT SPECIFICATIONS FOR REQUIREMENTS OF WATER ADDITION TO CONCRETE AT THE JOBSITE.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR FURNISHING AND INSTALLING ANCHOR BOLTS, CLIPS, INSERTS, CONNECTION PLATES, SLEEVES, SLOTS AND OTHER REQUIRED ITEMS IN ACCORDANCE WITH THE CONTRACT DRAWINGS, AND IN COOPERATION WITH OTHER TRADES PRIOR TO PLACING CONCRETE.

REINFORCING STEEL SHALL BE HIGH STRENGTH NEW BILLET STEEL CONFORMING TO ASTM A-615, GRADE 60 (60,000 PSI). WELDED WIRE FABRIC (WWF) SHALL CONFORM TO ASTM A-185. ALL REINFORCING SHALL BE DETAILING, FABRICATED, AND PLACED IN ACCORDANCE WITH ACI'S MANUAL OF STANDARD PRACTICE FOR CASTING CONCRETE STRUCTURES, (ACI-315). DETAILS OF REINFORCEMENT SHALL CONFORM TO ACI 318, ACI 315, AND CRSI STANDARDS.

ALL REINFORCING STEEL (INCLUDING WELDED WIRE FABRIC) SHALL BE SECURELY TIED AND ANCHORED IN PLACE TO PREVENT DISLOCATION DURING THE PLACING OPERATION.

REINFORCING STEEL SHALL BE CLEAN OF MUD, DEBRIS, LOOSE RUST, CEMENT, GROUT, OR ANY OTHER MATERIAL WHICH MAY INHIBIT THE BOND BETWEEN THE STEEL AND CONCRETE.

ASTM C39/C39M. MAKE SIX TEST CYLINDERS FOR EACH SET OF TESTS IN ACCORDANCE WITH ASTM C31/C31M. TAKE PRECAUTIONS TO PREVENT EVAPORATION AND LOSS OF WATER FROM THE SPECIMEN. TEST TWO CYLINDERS AT 7 DAYS, THREE CYLINDERS AT 28 DAYS, AND HOLD ONE CYLINDER IN RESERVE. TAKE SAMPLES FOR STRENGTH TESTS OF EACH MIX DESIGN OF AND FOR CONCRETE PLACED EACH DAY NOT LESS THAN ONCE A DAY, NOR LESS THAN ONCE FOR EACH 160 CUBIC YARDS OF CONCRETE, NOR LESS THAN ONCE FOR EACH 5400 SQUARE FEET OF SURFACE AREA FOR SLABS AND WALLS. FOR THE ENTIRE PROJECT, TAKE NO LESS THAN SIX SETS OF SAMPLES AND PERFORM STRENGTH TESTS FOR EACH MIX DESIGN OF CONCRETE PLACED. EACH STRENGTH TEST RESULT MUST BE THE AVERAGE OF TWO CYLINDERS FROM THE SAME CONCRETE SAMPLE TESTED AT 28 DAYS. IF THE AVERAGE OF ANY THREE CONSECUTIVE STRENGTH TEST RESULTS IS LESS THAN f'_c OR IF ANY STRENGTH TEST RESULT FALLS BELOW f'_c BY MORE THAN 450 PSI, TAKE A MINIMUM OF THREE ASTM C42/C42M CORE SAMPLES FROM THE IN-PLACE WORK REPRESENTED BY THE LOW TEST CYLINDER RESULTS AND TEST. CONCRETE REPRESENTED BY CORE TEST IS CONSIDERED STRUCTURALLY ADEQUATE IF THE AVERAGE OF THREE CORES IS EQUAL TO AT LEAST 85 PERCENT OF f'_c AND IF NO SINGLE CORE IS LESS THAN 75 PERCENT OF f'_c . RETEST LOCATIONS REPRESENTED BY ERRATIC CORE 180209 03 30 00 -17 STRENGTHS. REMOVE CONCRETE NOT MEETING STRENGTH CRITERIA AND PROVIDE NEW ACCEPTABLE CONCRETE. REPAIR CORE HOLES WITH NON SHRINK GROUT. MATCH COLOR AND FINISH OF ADJACENT CONCRETE.

CONCRETE PROTECTION FOR REINFORCEMENT

PROVIDE THE MINIMUM CLEARANCES (COVER) FOR REINFORCEMENT AS FOLLOWS:

FOOTINGS AND OTHER CONCRETE POURED AGAINST EARTH -	3"
FORMED CONCRETE EXPOSED TO EARTH -	2"
FORMED CONCRETE NOT EXPOSED TO WEATHER OR EARTH -	1 1/2"
SLABS ON GROUND, UNLESS OTHERWISE NOTED -	1 1/2" FROM TOP OF SLAB

MISCELLANEOUS ITEMS

THE CONTRACTOR IS SOLELY RESPONSIBLE FOR ALL SAFETY REGULATIONS, PROGRAMS AND PRECAUTIONS RELATED TO ALL WORK ON THIS PROJECT AND FOR THE PROTECTION OF PERSONS AND PROPERTY EITHER ON OR ADJACENT TO THE PROJECT AND SHALL PROTECT SAME AGAINST INJURY, DAMAGE OR LOSS.

THE CONTRACTOR IS RESPONSIBLE FOR LIMITING THE AMOUNT OF CONSTRUCTION LOAD IMPOSED ON THE STRUCTURE. SUCH LOADS SHALL NOT EXCEED THE CAPACITY OF THE STRUCTURE AT ANY TIME.

THE STRUCTURE IS DESIGNED TO FUNCTION AS A UNIT UPON COMPLETION, AND ANY TEMPORARY BRACING OR SUPPORT REQUIRED TO ACCOMMODATE THE CONTRACTOR'S MEANS AND METHODS ARE THE RESPONSIBILITY OF THE CONTRACTOR.

THE CONTRACTOR IS TO VERIFY ALL OPENING SIZES AND LOCATIONS WITH THE REQUIREMENTS OF OTHER TRADES PRIOR TO FABRICATION AND ERECTION.

STRUCTURAL DRAWINGS SHALL BE USED IN CONJUNCTION WITH THE ARCHITECTURAL, MECHANICAL, ELECTRICAL AND PLUMBING DRAWINGS, AND THE CONTRACTOR SHALL BE RESPONSIBLE FOR SEEING THAT THE WORK OF ALL TRADES IS COORDINATED WITH ADJACENT WORK.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR DESIGNING, FURNISHING, ERECTING AND REMOVING ANY TEMPORARY SHORING AND BRACING DURING CONSTRUCTION.

THE ARCHITECT AND ENGINEER SHALL BE NOTIFIED AT THE PROPER TIME WHEN ALL ITEMS ARE READY FOR OBSERVATION. SUFFICIENT NOTICE SHALL BE GIVEN BY THE CONTRACTOR TO ALLOW FOR SCHEDULING OF OBSERVATIONS.

SAFETY REGULATIONS SHALL BE STRICTLY FOLLOWED BY THE CONTRACTOR OR SUBCONTRACTOR DURING ALL TIMES OF WORK ON THIS PROJECT. THE ARCHITECT OR ENGINEER SHALL NOT HAVE CONTROL OR CHARGE OF, AND SHALL NOT BE RESPONSIBLE FOR CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES OR PROCEDURES, FOR SAFETY PRECAUTIONS AND PROGRAMS IN CONNECTION WITH THE WORK, FOR ACTS OF OMISSIONS OF THE CONTRACTOR, SUBCONTRACTORS, OR ANY OTHER PERSONS PERFORMING ANY OF THE WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.

ALL SPECIALTY BOLTS, INCLUDING EXPANSION TYPE AND EPOXY TYPE ANCHORS SHALL BE INSTALLED IN STRICT ACCORDANCE WITH THE MANUFACTURER'S PRINTED INSTRUCTIONS.

THE CONTRACTOR SHALL PROTECT FROM DAMAGES EXISTING BUILDING(S), OWNER EQUIPMENT, ROADS, WALKS AND UTILITIES. THE CONTRACTOR SHALL MAINTAIN THESE DURING THE COURSE OF THE WORK, AND SHALL REPAIR ALL DAMAGES AT NO ADDITIONAL EXPENSE TO THE OWNER.

IN AREAS WHERE THE DRAWINGS DO NOT ADDRESS METHODOLOGY, THE CONTRACTOR SHALL BE BOUND TO PERFORM IN STRICT COMPLIANCE WITH MANUFACTURER'S SPECIFICATIONS AND/OR RECOMMENDATIONS.

ON-SITE VERIFICATION OF ALL DIMENSIONS AND CONDITIONS SHALL BE THE RESPONSIBILITY OF THE GENERAL CONTRACTOR AND HIS SUBCONTRACTORS. NOTED DIMENSIONS SHALL TAKE PRECEDENCE OVER SCALE.

THE GENERAL NOTES AND TYPICAL DETAILS APPLIED THROUGHOUT THE JOB UNLESS OTHERWISE NOTED OR SHOWN.

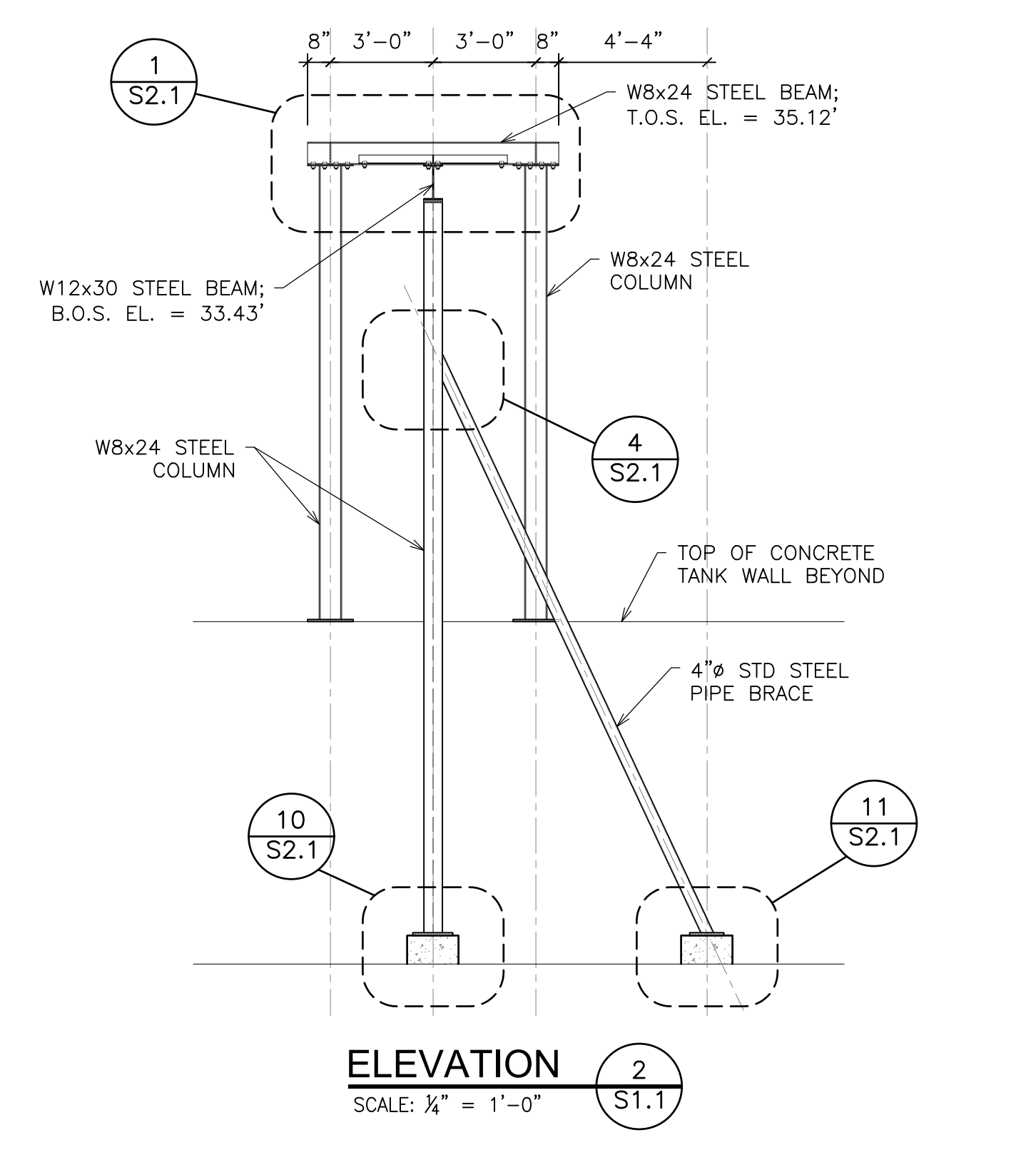
THE CONTRACTOR SHALL COMPARE AND COORDINATE ALL DRAWINGS. IF A DISCREPANCY EXISTS, HE SHALL PROMPTLY REPORT IT FOR PROPER ADJUSTMENT BEFORE PROCEEDING WITH THE WORK.

IN THE EVENT THAT CERTAIN FEATURES OF THE CONSTRUCTION ARE NOT FULLY SHOWN ON THE DRAWINGS, THEIR CONSTRUCTION SHALL BE OF THE SAME CHARACTER AS SIMILAR CONDITIONS THAT ARE SHOWN OR NOTED.

THESE PLANS ARE SUBJECT TO MODIFICATIONS AS NECESSARY TO MEET CODE REQUIREMENTS OR TO FACILITATE MECHANICAL, PLUMBING INSTALLATIONS OR TO INCORPORATE DESIGN IMPROVEMENTS.

SHOP DRAWINGS

THE GENERAL CONTRACTOR SHALL SUBMIT SHOP DRAWINGS FOR ALL STRUCTURAL ELEMENTS SHOWN ON THE CONTRACT DOCUMENTS FOR APPROVAL. THE STRUCTURAL ENGINEER WILL NOT BE RESPONSIBLE FOR THE STRUCTURAL CERTIFICATION AND DESIGN OF THE PROJECT IF THE GENERAL CONTRACTOR FAILS TO OBTAIN APPROVAL OF THE SHOP DRAWINGS. THE GENERAL CONTRACTOR SHALL INFORM THE STRUCTURAL ENGINEER IN WRITING CONCERNING DEVIATIONS AND/OR OMISSIONS FROM THE CONTRACT DOCUMENTS AT THE TIME OF SHOP DRAWING SUBMISSION. THE GENERAL CONTRACTOR SHALL REVIEW ALL SHOP DRAWINGS AND SHALL MAKE ALL CORRECTIONS HE DEEMS NECESSARY BEFORE SUBMISSION. THE GENERAL CONTRACTOR SHALL STATE ON THE SHOP DRAWINGS THAT CONTRACT DOCUMENT REQUIREMENTS HAVE BEEN MET AND THAT ALL DIMENSIONS, CONDITIONS AND QUANTITIES HAVE BEEN REVIEWED AND VERIFIED AS SHOWN AND/OR CORRECTED ON THE SHOP DRAWINGS.



ELEVATION 2
SCALE: 1/4" = 1'-0"

PRINTS ISSUED FOR:
BID SET

DATE: _____

REVISIONS:

NO. _____

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RIDDLE FARM WWTP
EQUIPMENT UPGRADES

WORCESTER COUNTY, MARYLAND

STATE OF MARYLAND
 REGISTERED PROFESSIONAL ENGINEER
 No. 115
 09/29/2018

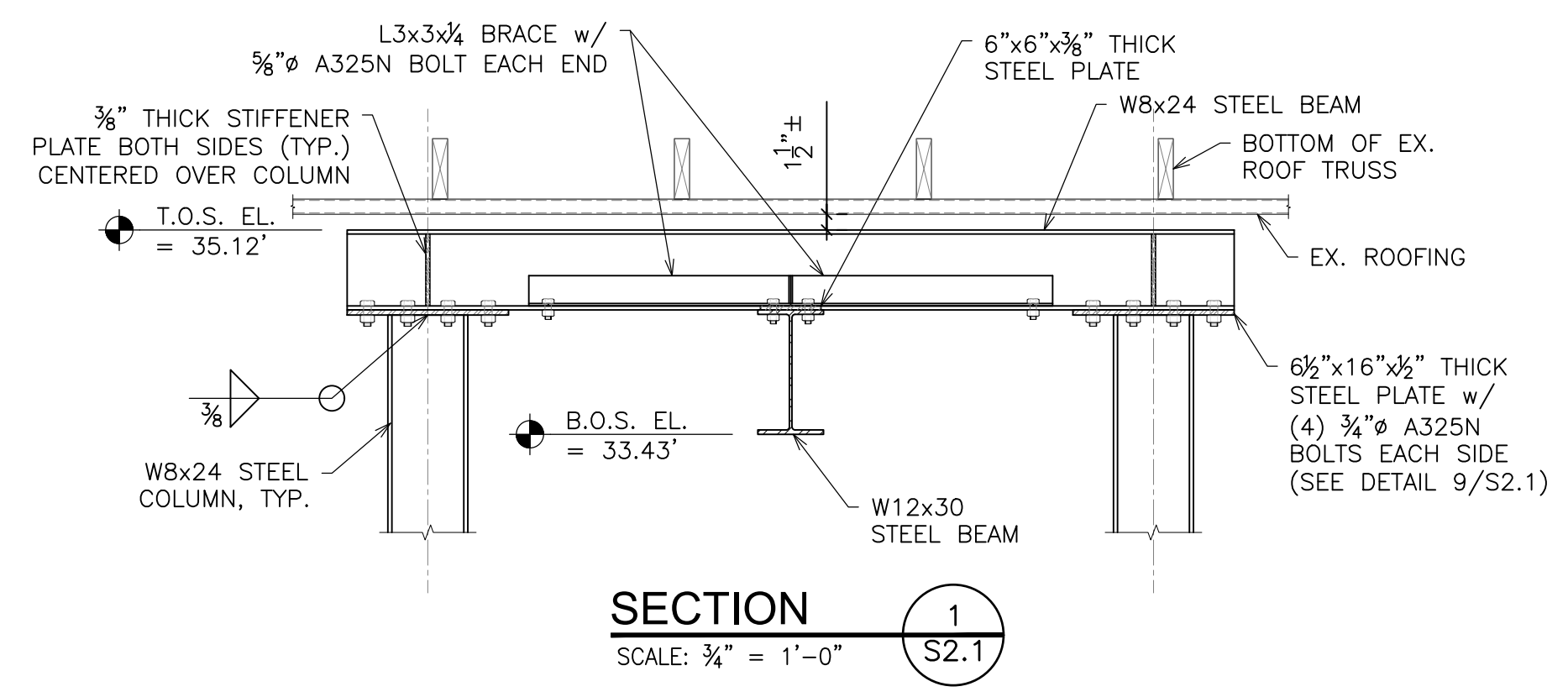
PLANS,
ELEVATIONS,
AND NOTES

SCALE: AS NOTED SHEET NO.
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 CHECKED BY: ARM
 GMB FILE: 220047
 DATE: SEPT 2023

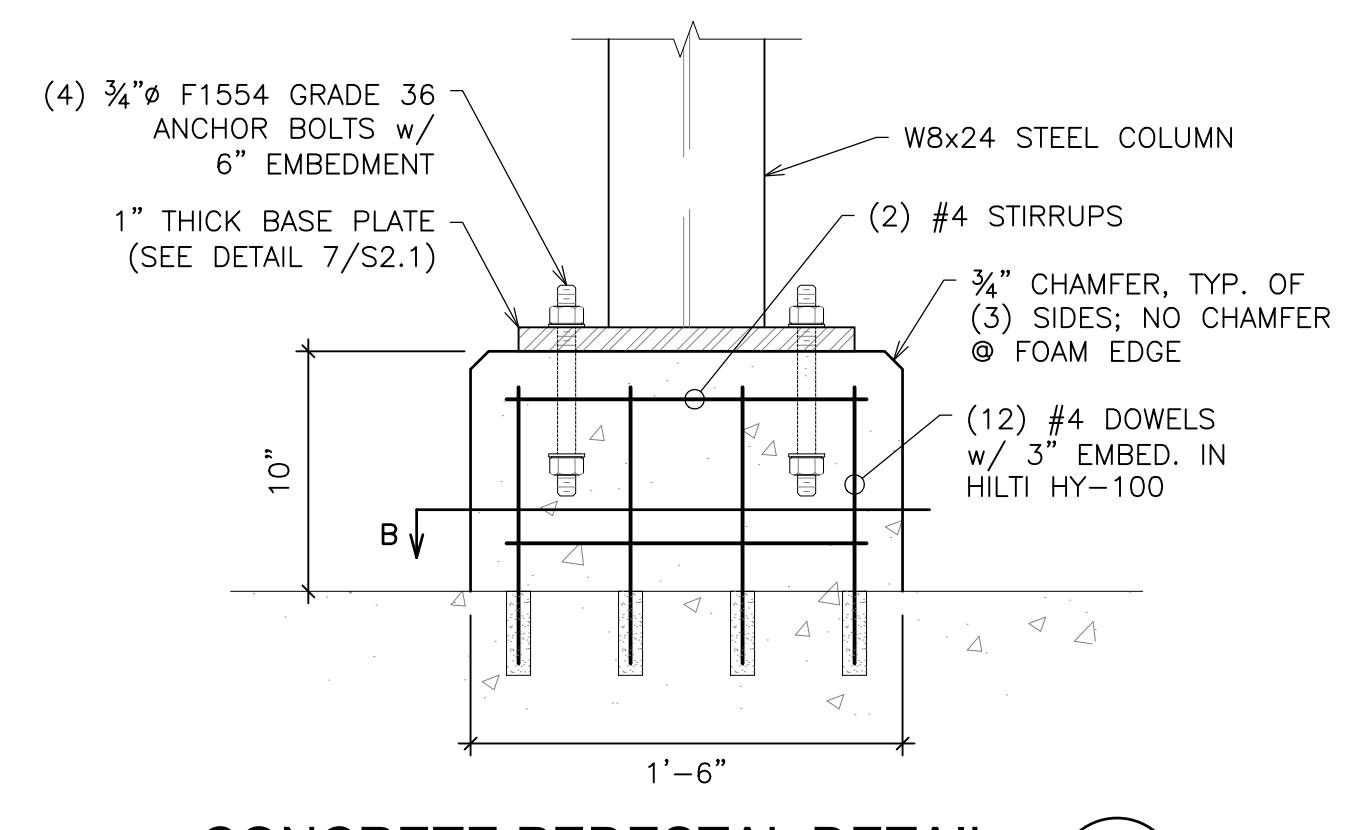
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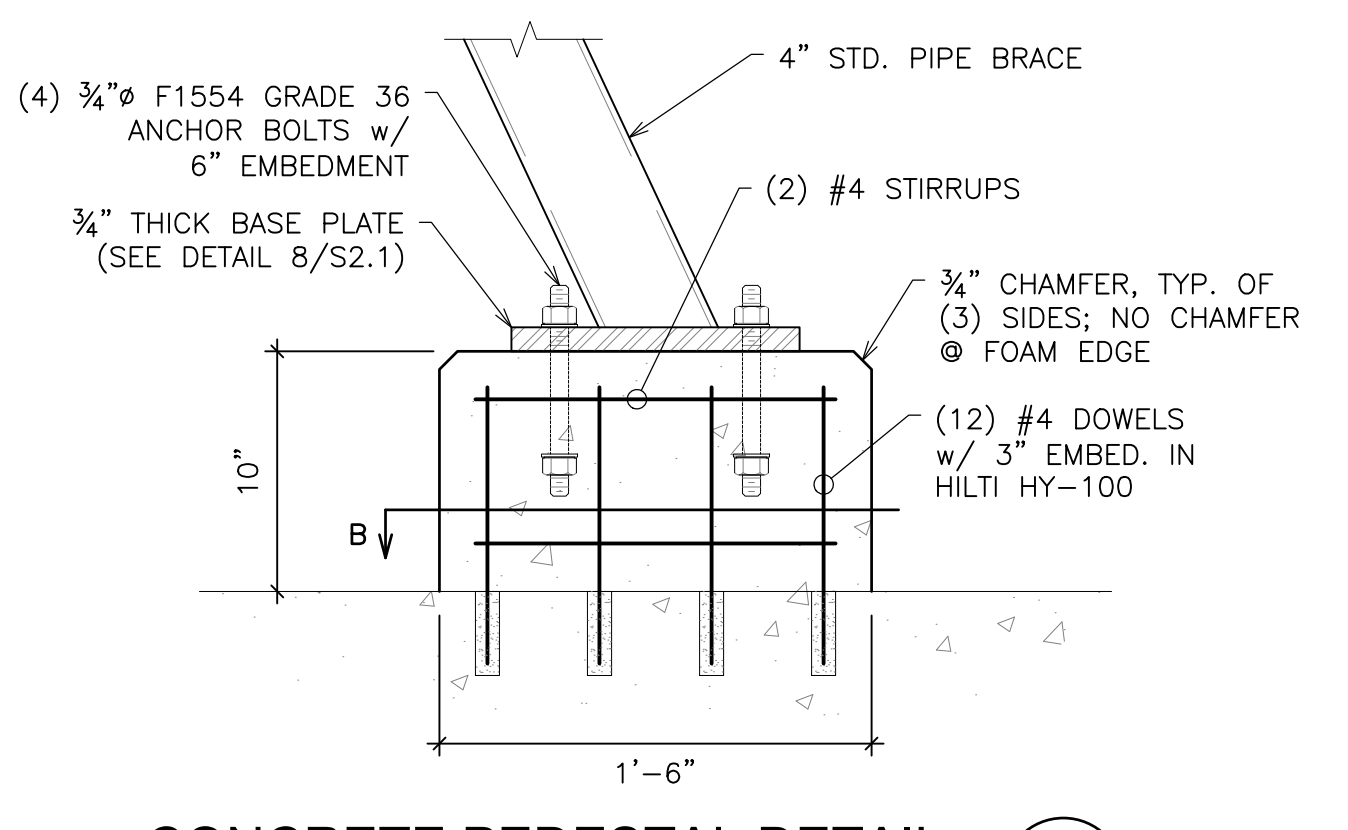
DATE	
REVISIONS	
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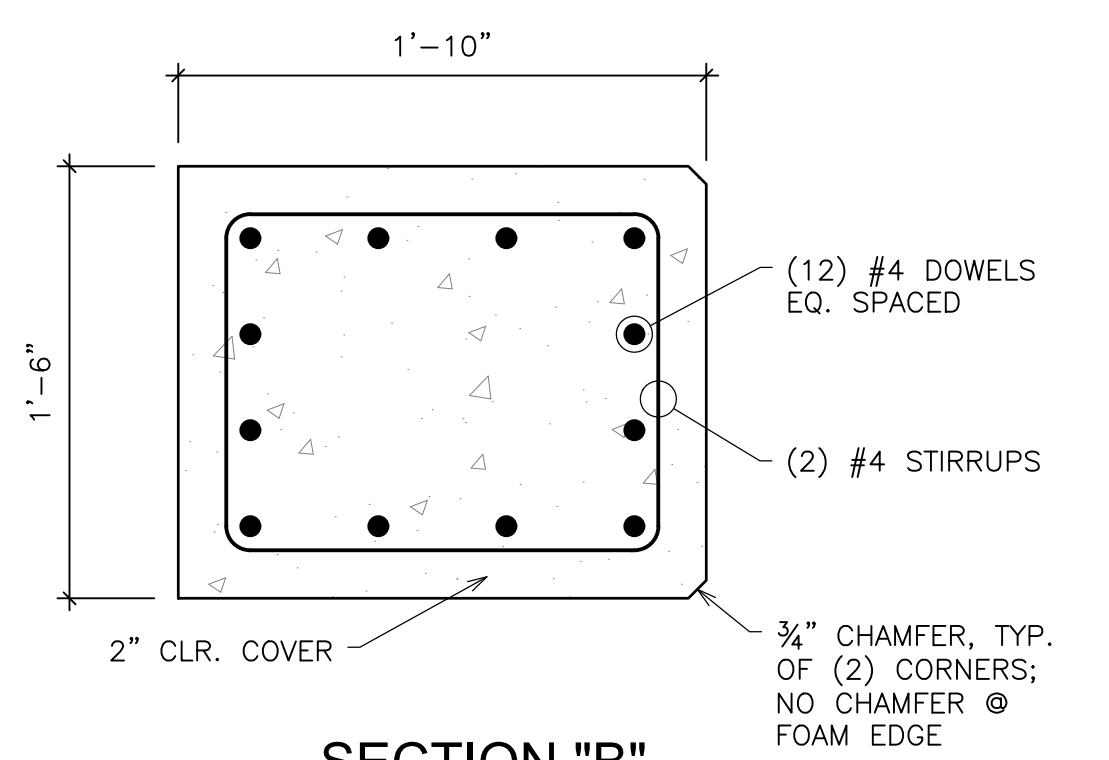
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S2.1



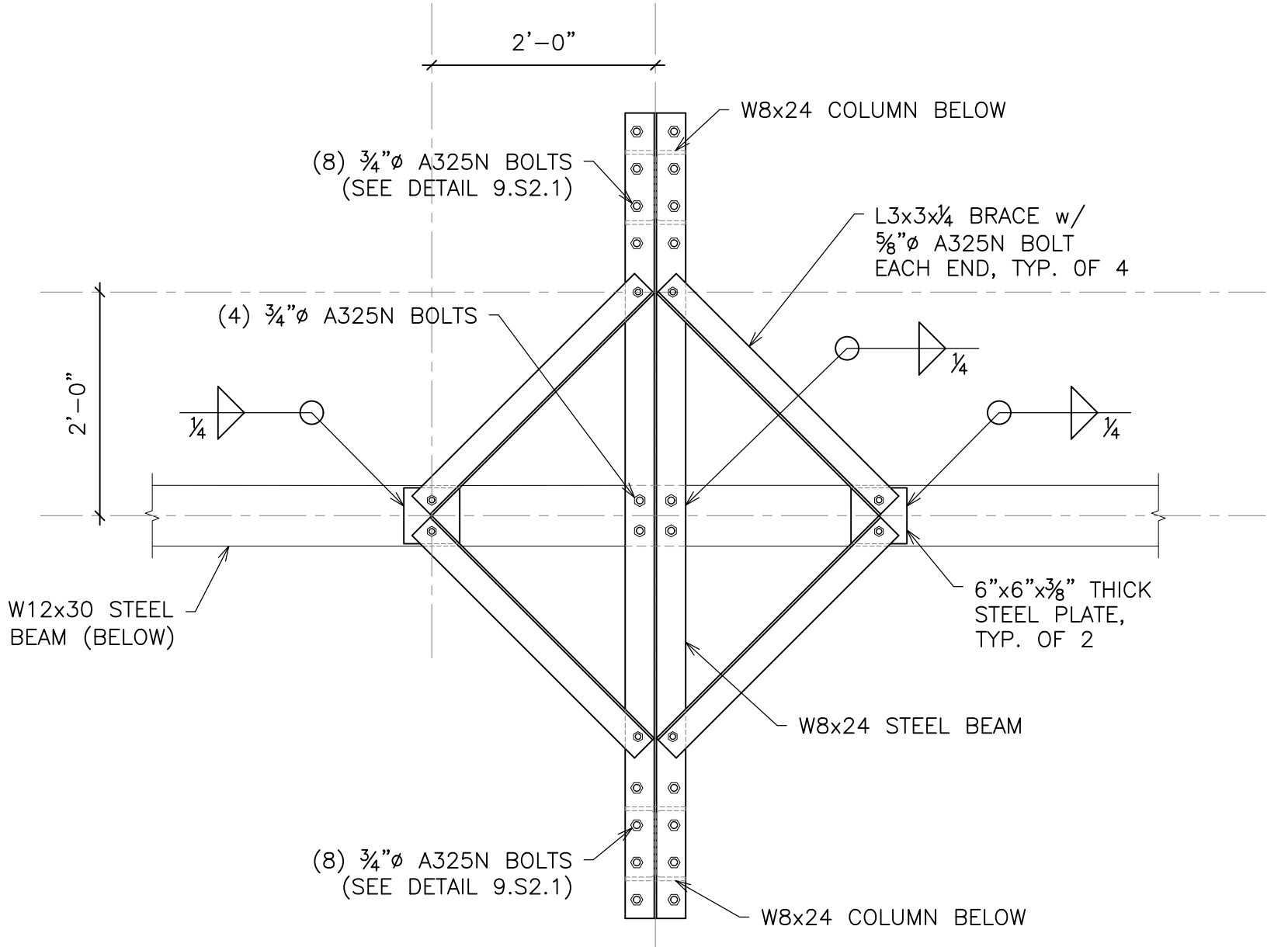
CONCRETE PEDESTAL DETAIL 10
SCALE: 1 1/2" = 1'-0"
S2.1



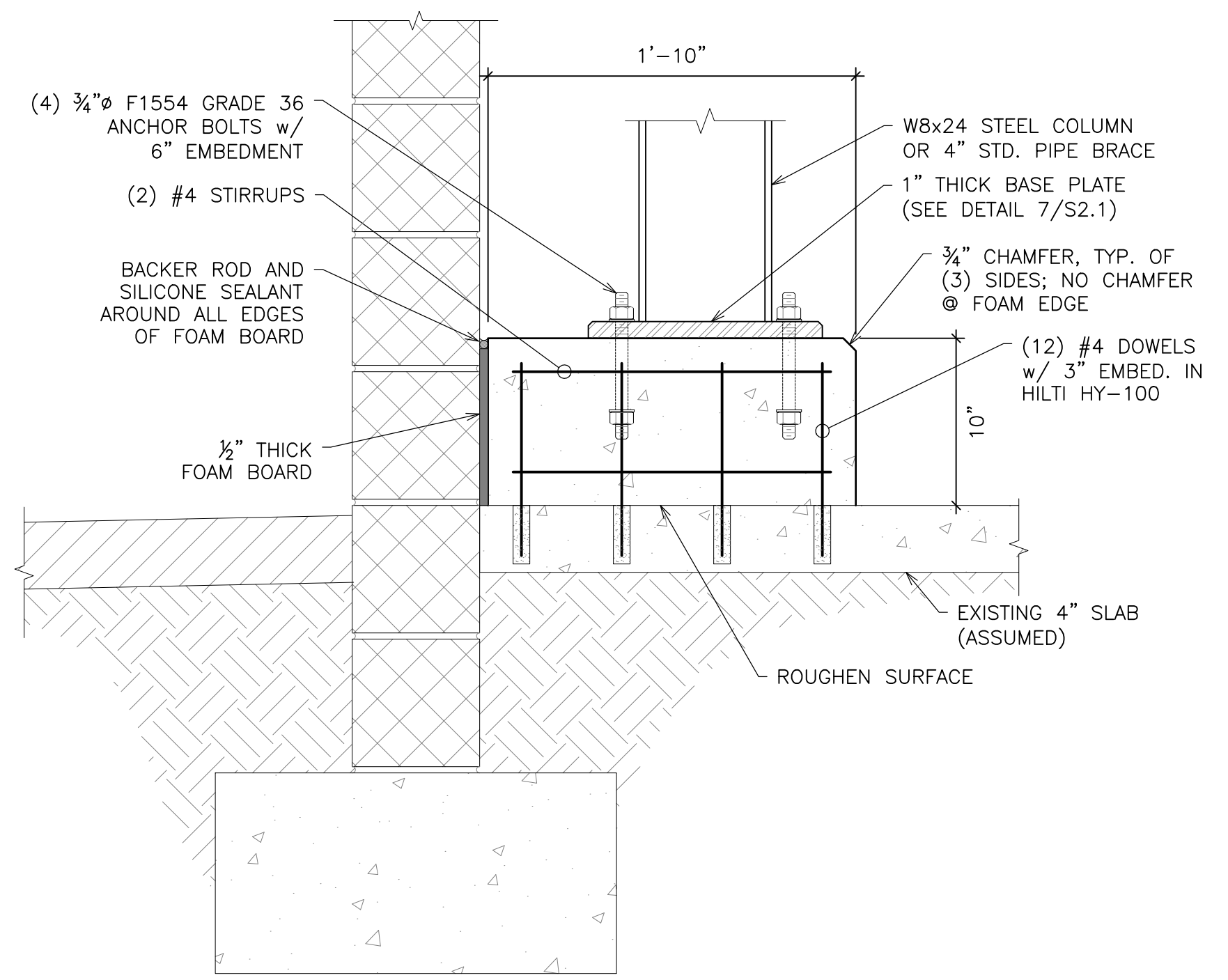
CONCRETE PEDESTAL DETAIL 11
SCALE: 1 1/2" = 1'-0"
S2.1



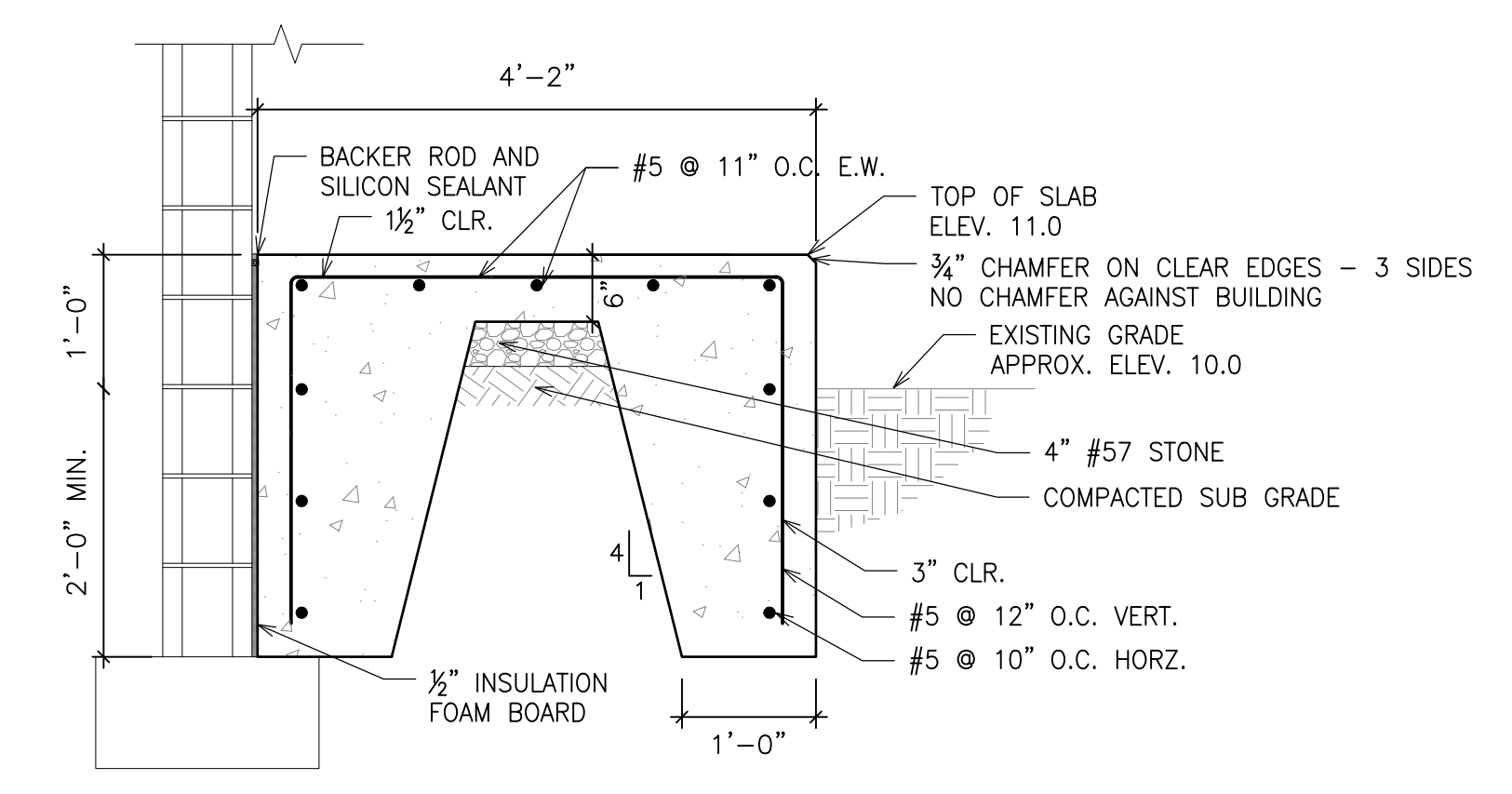
SECTION "B"
SCALE: 1 1/2" = 1'-0"



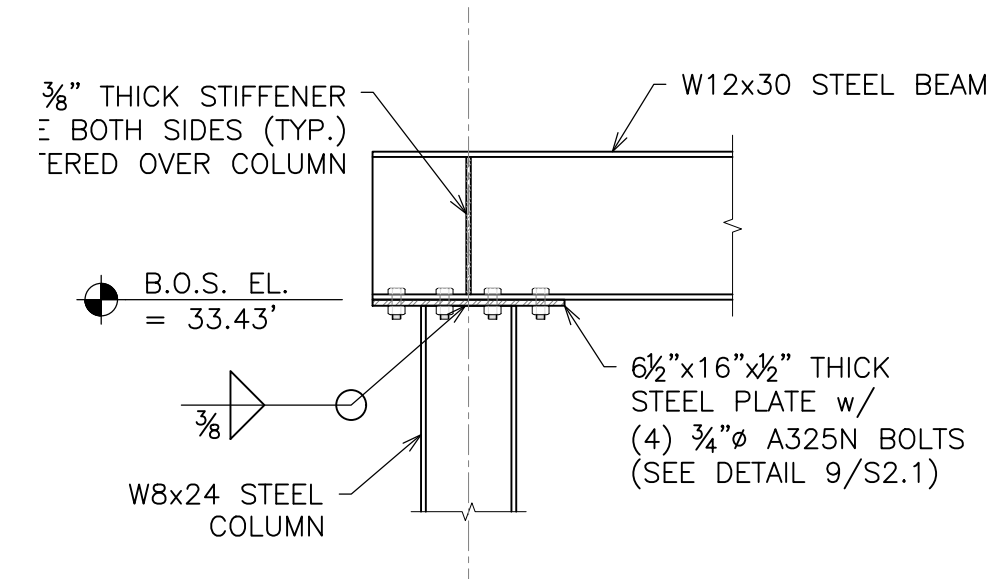
SECTION 2
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S2.1



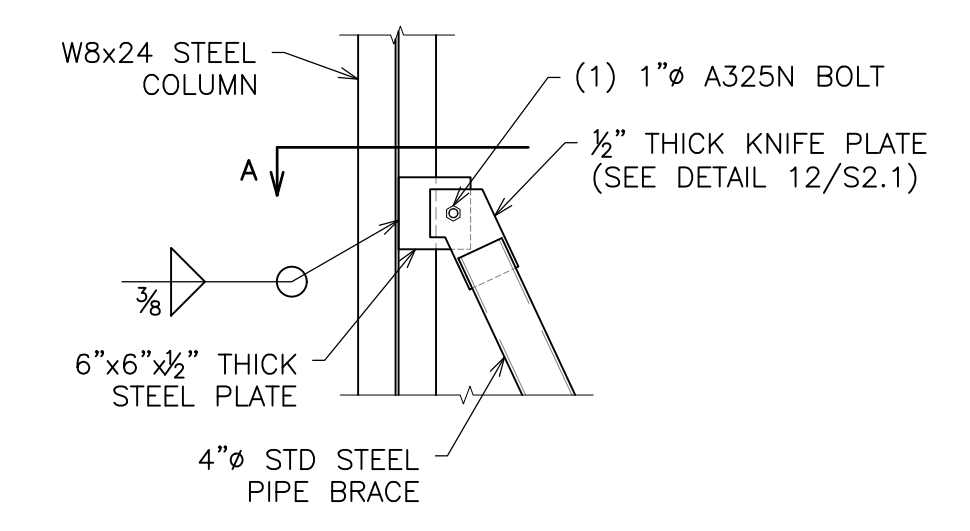
SECTION 13
SCALE: 1 1/2" = 1'-0"
S2.1



BLOWER PAD SECTION
SCALE: 3/4" = 1'-0"



SECTION 3
SCALE: 3/4" = 1'-0"
S2.1



SECTION 4
SCALE: 3/4" = 1'-0"
S2.1

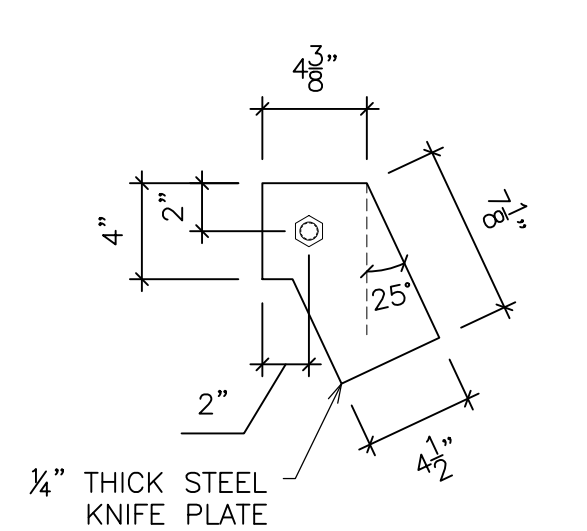
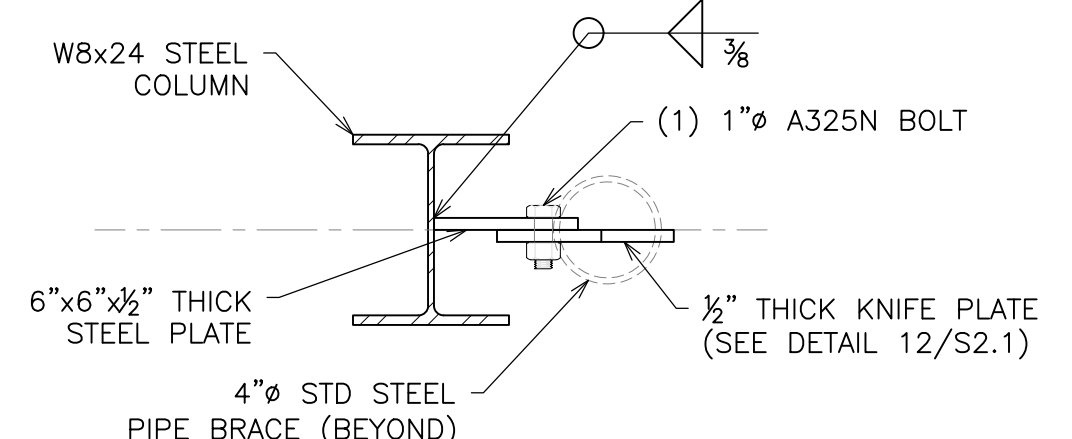
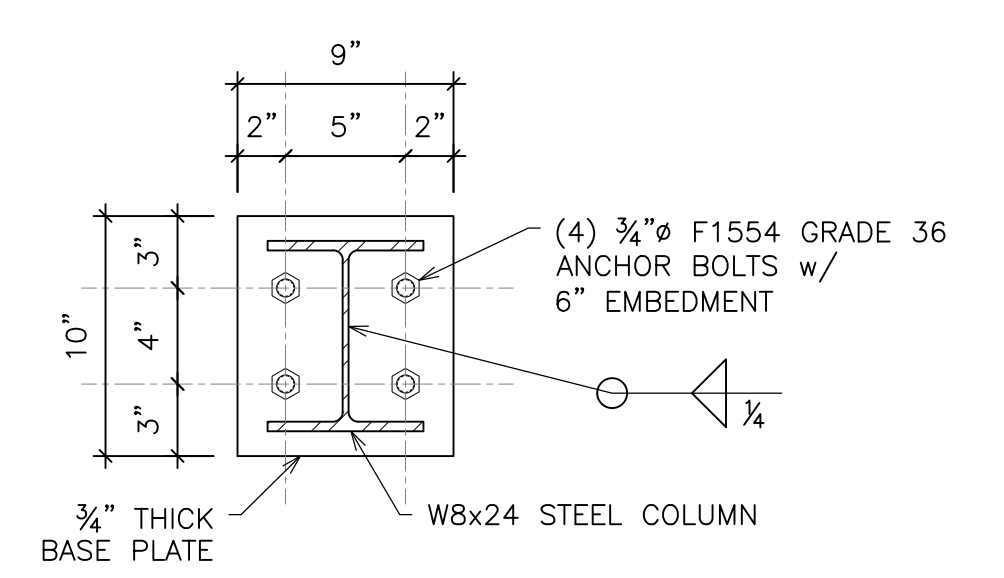


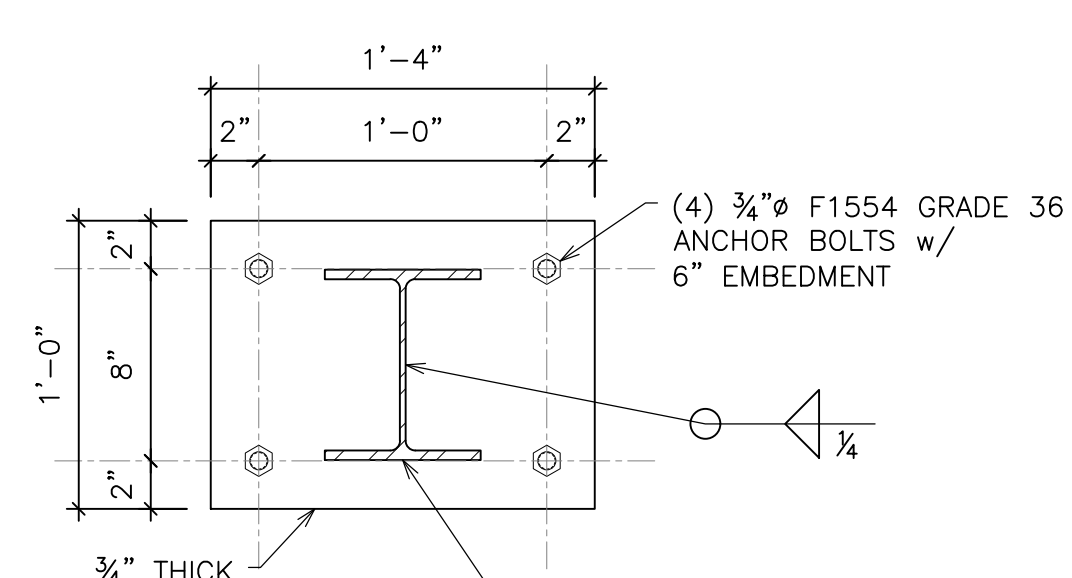
PLATE DETAIL 12
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S2.1



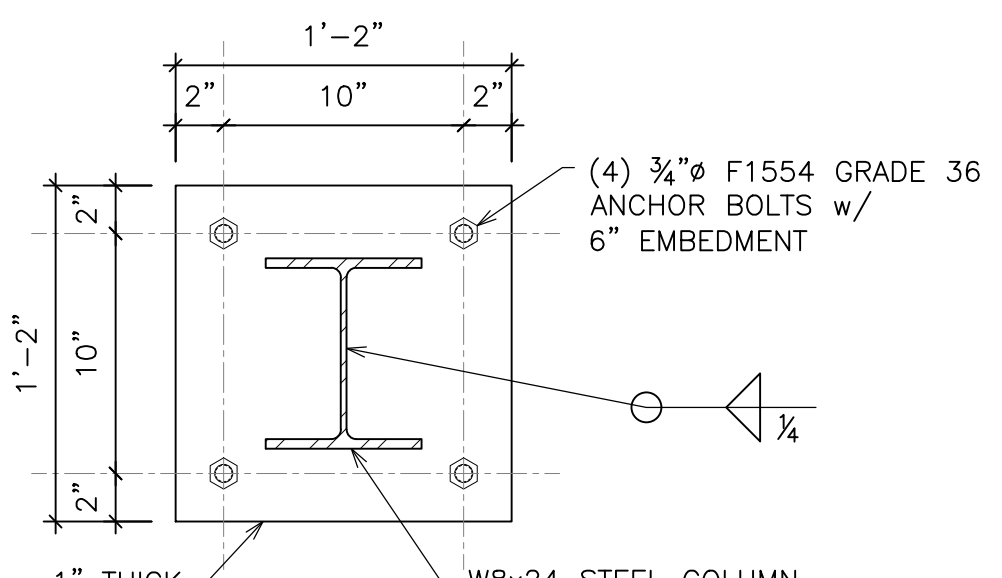
SECTION "A"
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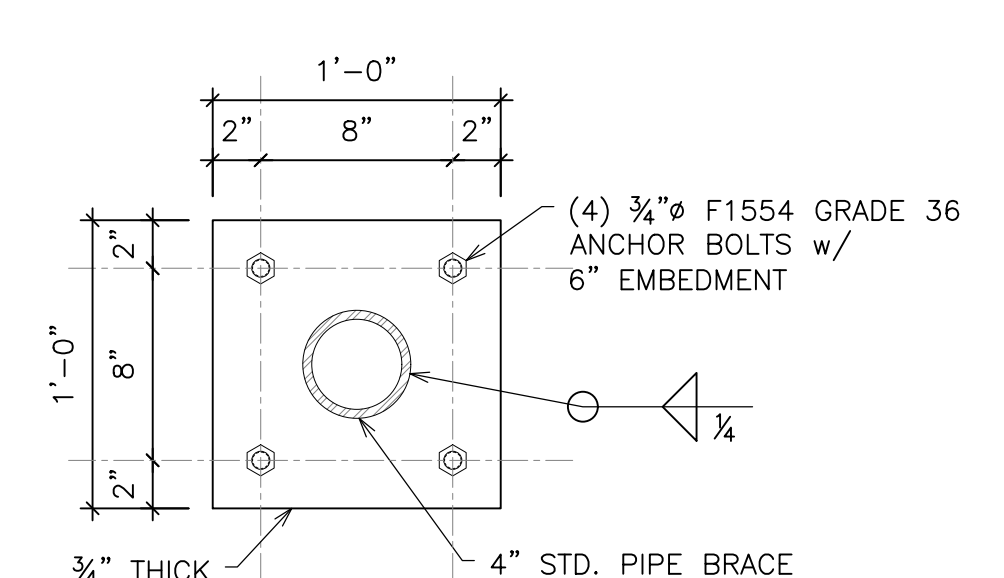
BASE PLATE 1 DETAIL 5
SCALE: 1 1/2" = 1'-0"
S2.1



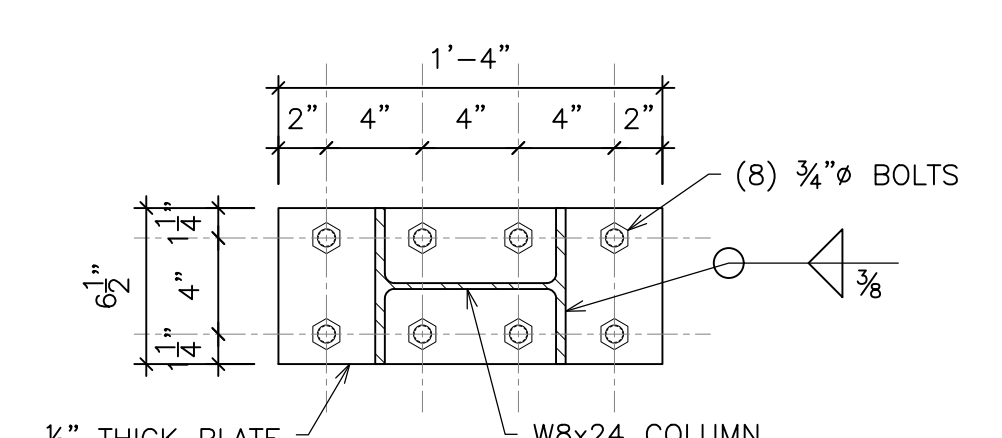
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SCALE: 1 1/2" = 1'-0"
S2.1



BASE PLATE 3 DETAIL 7
SCALE: 1 1/2" = 1'-0"
S2.1



BASE PLATE 4 DETAIL 8
SCALE: 1 1/2" = 1'-0"
S2.1



CAP PLATE DETAIL 9
SCALE: 1 1/2" = 1'-0"
S2.1

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RIDDLE FARM WWTP
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 WORCESTER COUNTY, MARYLAND

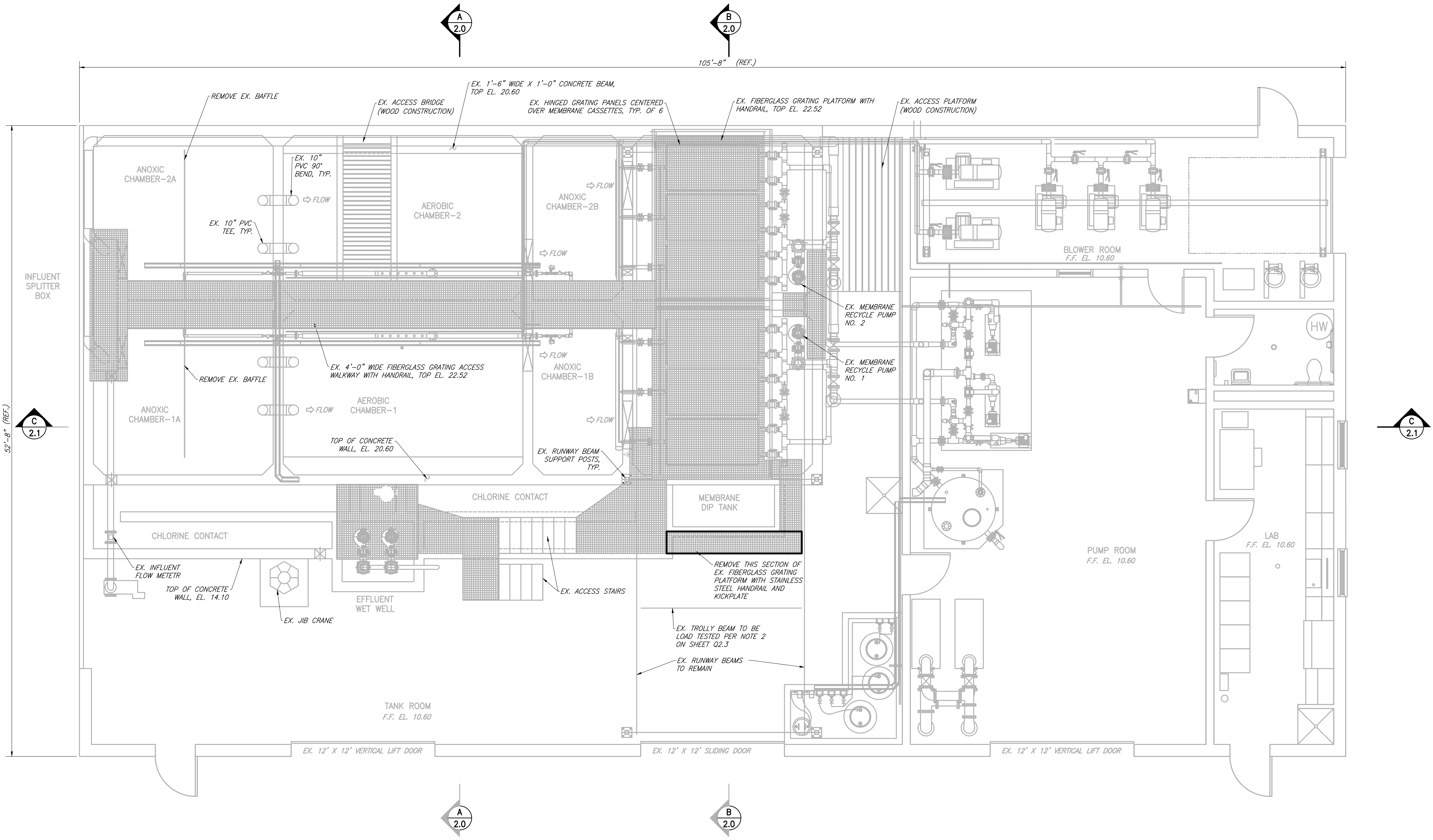


SECTIONS AND DETAILS

SCALE	AS NOTED	SHEET NO.
DESIGN BY	BGA	S2.1
DRAWN BY	TFVT	
CHECKED BY	ARM	
GMB FILE	220047	
DATE	SEPT 2023	

PLOT CODE: PENN-ORANGE (207 INCHES (52mm))
 PENN-RED (206 INCHES (52mm))
 PENN-YELLOW (207 INCHES (52mm))
 PENN-GREEN (208 INCHES (53mm))
 PENN-BLUE (209 INCHES (53mm))
 PENN-MAGENTA (210 INCHES (53mm))
 PENN-BLACK (211 INCHES (54mm))

DATE	
REVISIONS	
NO.	



TOP PLAN
WASTEWATER BUILDING DEMOLITION PLAN
 SCALE: 1/4" = 1'-0"



PEN-YELLOW 1/8" INCHES (3.18mm)
 PEN-YELLOW 3/16" INCHES (4.76mm)
 PEN-YELLOW 1/4" INCHES (6.35mm)
 PEN-YELLOW 3/8" INCHES (9.52mm)
 PEN-YELLOW 1/2" INCHES (12.70mm)
 PEN-YELLOW 3/4" INCHES (19.05mm)
 PEN-YELLOW 1" INCHES (25.40mm)
 PEN-YELLOW 1 1/2" INCHES (38.10mm)
 PEN-YELLOW 2" INCHES (50.80mm)
 PEN-YELLOW 3" INCHES (76.20mm)
 PEN-YELLOW 4" INCHES (101.60mm)
 PEN-YELLOW 6" INCHES (152.40mm)
 PEN-YELLOW 8" INCHES (203.20mm)
 PEN-YELLOW 12" INCHES (304.80mm)
 PEN-YELLOW 18" INCHES (457.20mm)
 PEN-YELLOW 24" INCHES (609.60mm)
 PEN-YELLOW 36" INCHES (914.40mm)
 PEN-YELLOW 48" INCHES (1219.20mm)
 PEN-YELLOW 60" INCHES (1524.00mm)
 PEN-YELLOW 72" INCHES (1828.80mm)
 PEN-YELLOW 84" INCHES (2133.60mm)
 PEN-YELLOW 96" INCHES (2438.40mm)
 PEN-YELLOW 108" INCHES (2743.20mm)
 PEN-YELLOW 120" INCHES (3048.00mm)

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**RIDDLE FARM WWTP
 EQUIPMENT UPGRADES**

WORCESTER COUNTY, MARYLAND



**WASTEWATER
 BUILDING
 DEMOLITION
 TOP PLAN**

SCALE	AS SHOWN	SHEET NO.	
DESIGN BY	CBD		
DRAWN BY	MWD		
CHECKED BY	PAB		
GMB FILE	220047		
DATE	SEPTEMBER 2023		

Q-1.1

DATE	
REVISIONS	
NO.	

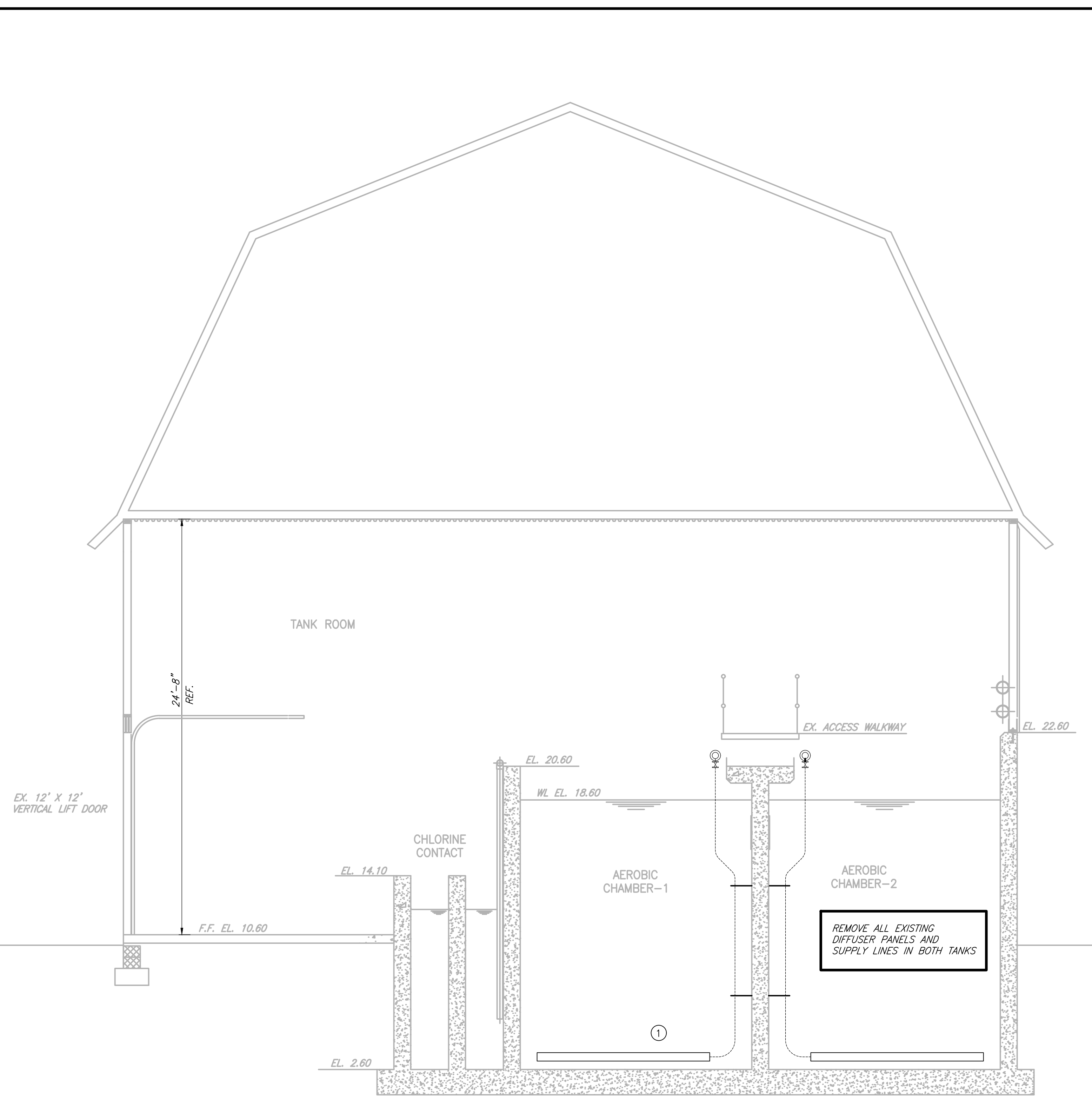
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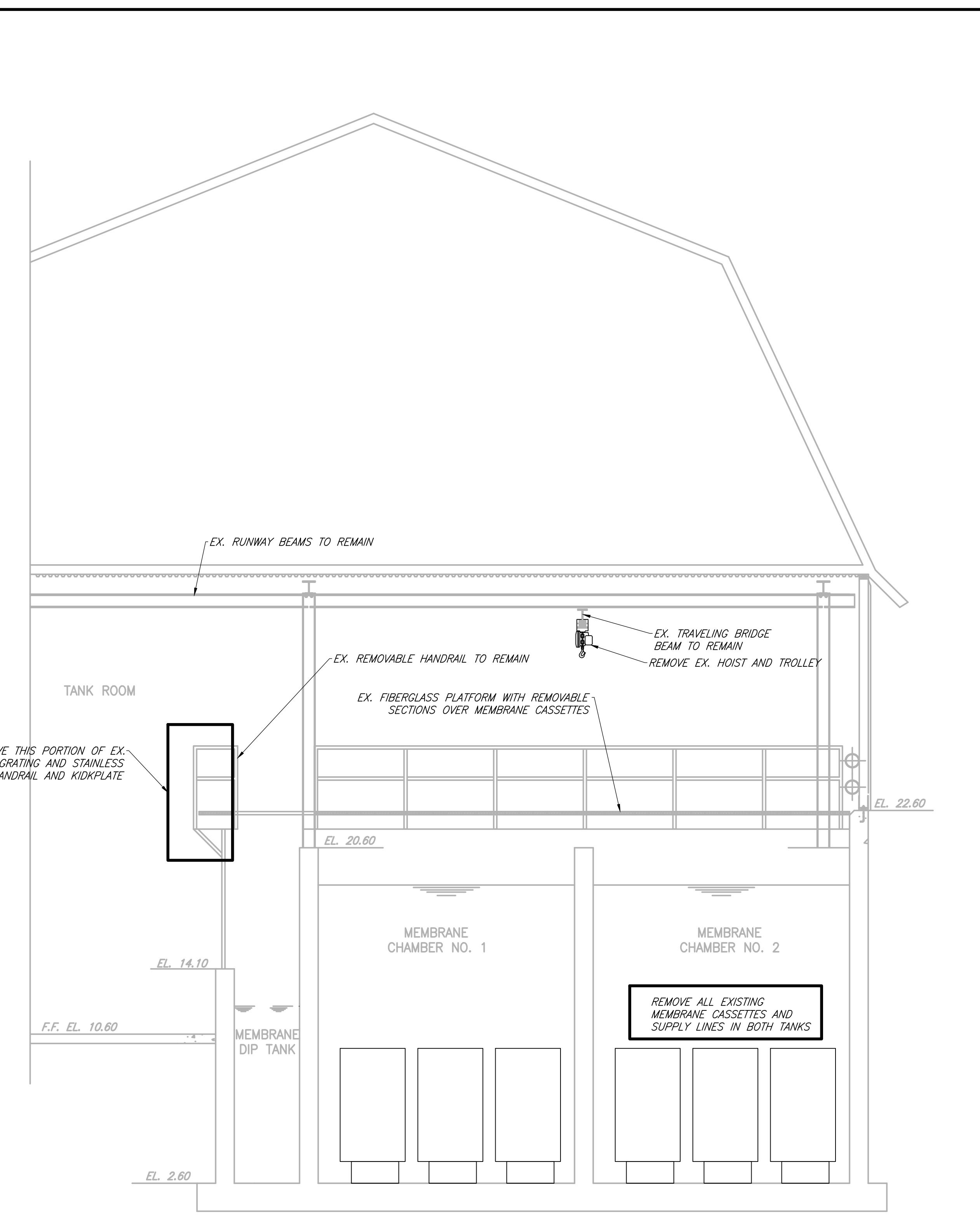
WASTEWATER
 BUILDING
 DEMOLITION
 SECTIONS

SCALE	AS SHOWN	SHEET NO.
DESIGN BY	CBG	Q-2.0
DRAWN BY	MWD	
CHECKED BY	PAB	
GMB FILE	220047	
DATE	SEPTEMBER 2023	



SECTION A
 SCALE: 1/4" = 1'-0" 1.0

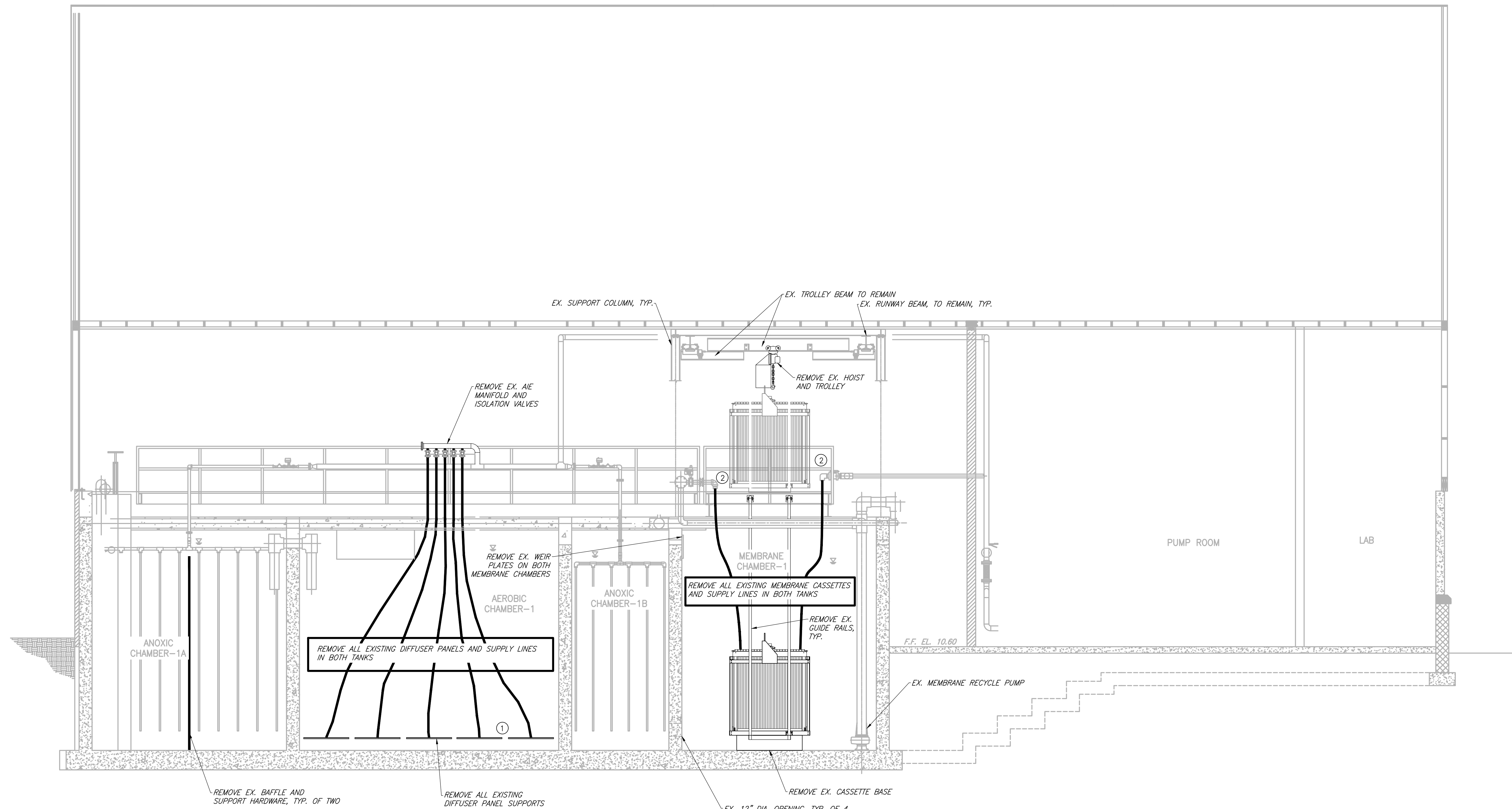
DEMOLITION NOTES
 1 REMOVE ALL ANCHORING HARDWARE. GRIND ALL STUD BOLTS DOWN TO 1" BELOW CONCRETE SURFACE, FLOOR AND WALL, REPAIR HOLES WITH NON-SHRINK GROUT.



SECTION B
 SCALE: 1/4" = 1'-0" 1.0

PLOT CODE
 PEN-BLUE (0.01 INCHES (0.25mm))
 PEN-BLACK (0.01 INCHES (0.25mm))
 PEN-RED (0.01 INCHES (0.25mm))
 PEN-YELLOW (0.01 INCHES (0.25mm))
 PEN-GREEN (0.01 INCHES (0.25mm))
 PEN-ORANGE (0.01 INCHES (0.25mm))
 PEN-PINK (0.01 INCHES (0.25mm))
 PEN-GRAY (0.01 INCHES (0.25mm))
 PEN-WHITE (0.01 INCHES (0.25mm))

DATE	
REVISIONS	
NO.	



SECTION C
SCALE: 1/4" = 1'-0" 1.0

DEMOLITION NOTES

- ① REMOVE ALL ANCHORING HARDWARE. GRIND ALL STUD BOLTS DOWN TO 1" BELOW CONCRETE SURFACE, FLOOR AND WALL, REPAIR HOLES WITH NON-SHRINK GROUT.
- ② DISCONNECT ALL PERMEATE AND AIR HOSES.

PLOT CODE
PEN=RED (0.08 INCHES (2.0mm))
PEN=YELLOW (0.07 INCHES (1.8mm))
PEN=GREEN (0.10 INCHES (2.5mm))
PEN=BLUE (0.02 INCHES (0.5mm))
PEN=BLACK (0.02 INCHES (0.5mm))
PEN=WHITE (0.39 INCHES (10.0mm))

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WORCESTER COUNTY, MARYLAND



WASTEWATER
BUILDING
DEMOLITION
SECTION C

SCALE	AS SHOWN	SHEET NO.	
DESIGN BY	CBD	Q-2.1	
DRAWN BY	MWD		
CHECKED BY	PAB		
GMB FILE	220047		
DATE	SEPTEMBER 2023		

DATE	
REVISIONS	
NO.	

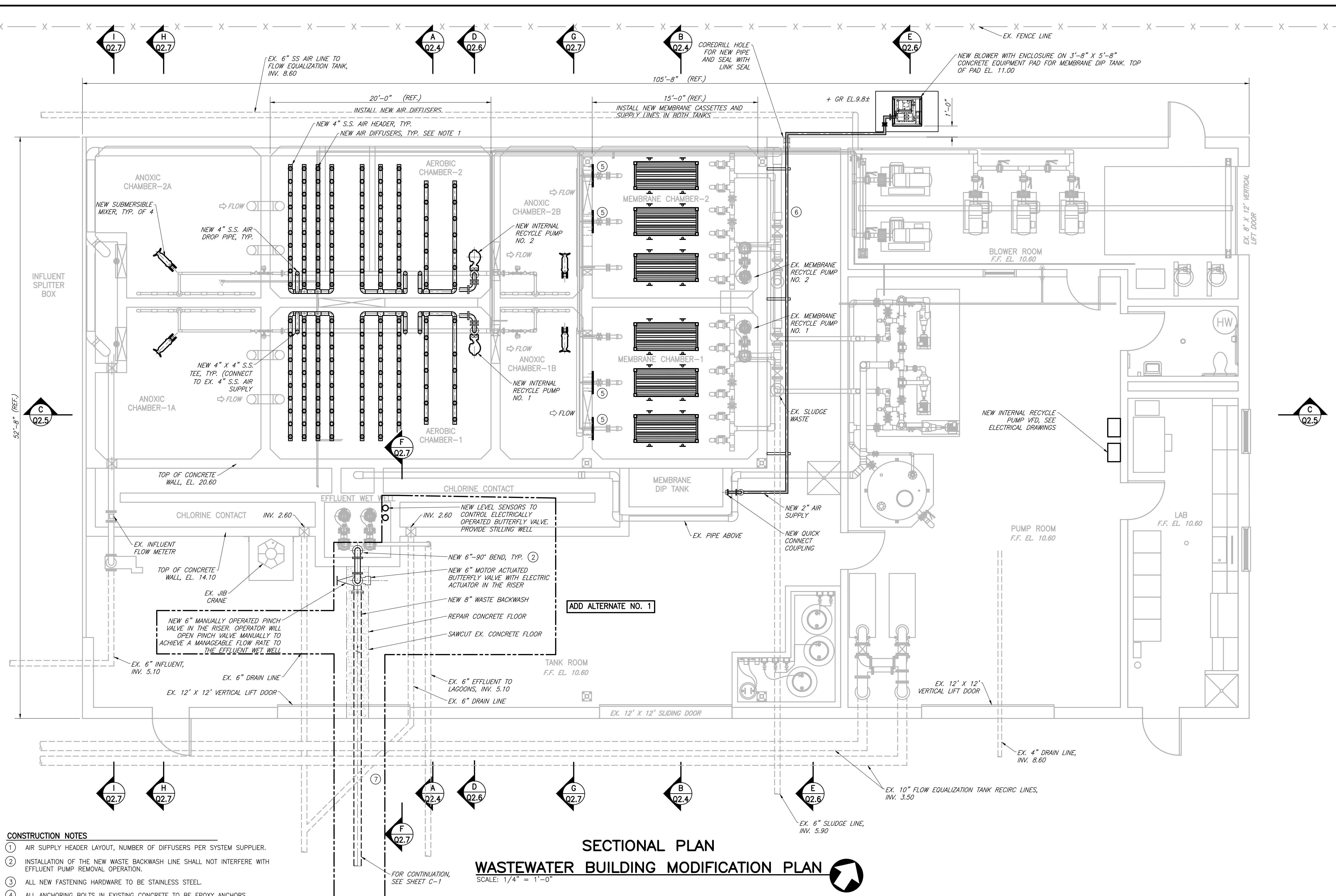
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WASTEWATER
 BUILDING
 MODIFICATION
 SECTIONAL PLAN

SCALE : AS SHOWN	SHEET NO.
DESIGN BY : CBD	Q-2.2
DRAWN BY : MWD	
CHECKED BY : PAB	
GMB FILE : 220047	
DATE : SEPTEMBER 2023	

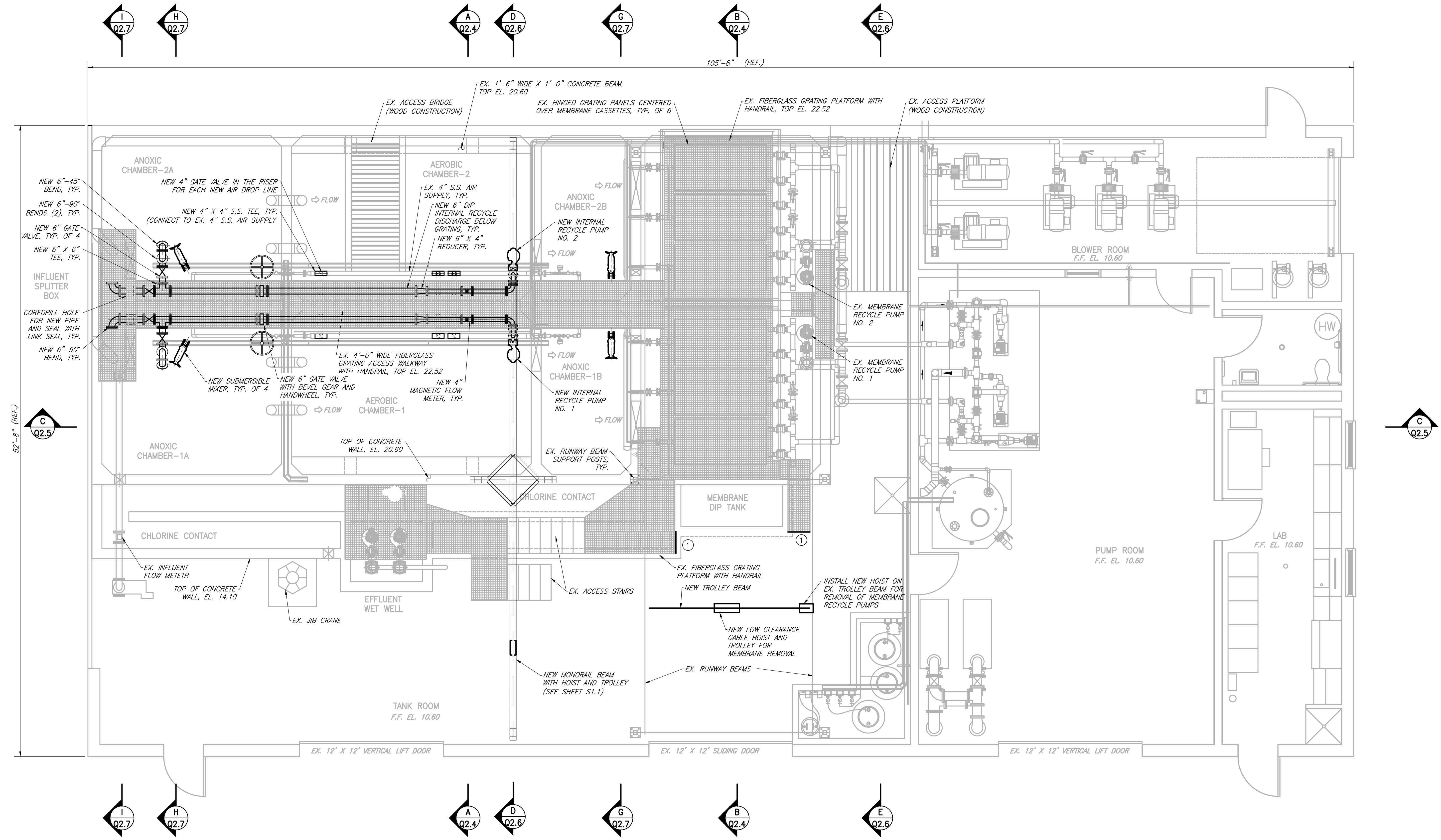


SECTIONAL PLAN
WASTEWATER BUILDING MODIFICATION PLAN
 SCALE: 1/4" = 1'-0"

- CONSTRUCTION NOTES**
- AIR SUPPLY HEADER LAYOUT, NUMBER OF DIFFUSERS PER SYSTEM SUPPLIER.
 - INSTALLATION OF THE NEW WASTE BACKWASH LINE SHALL NOT INTERFERE WITH EFFLUENT PUMP REMOVAL OPERATION.
 - ALL NEW FASTENING HARDWARE TO BE STAINLESS STEEL.
 - ALL ANCHORING BOLTS IN EXISTING CONCRETE TO BE EPOXY ANCHORS.
 - SEAL EXISTING OPENING IN EX. WALL WITH 1/2" THICK STAINLESS STEEL PLATE, SIZE TO BE 6" LARGER ALL AROUND. ATTACH TO WALL WITH S.S. EPOXY ANCHORS, 6" O.C. ON 4 SIDES. CALK BETWEEN WALL AND PLATE.
 - CONTRACTOR SHALL ROUTE NEW AIR PIPING AS NEEDED TO AVOID CONFLICTS WITH EXISTING PIPES.
 - CONTRACTOR SHALL TEST PIT THIS AREA TO VERIFY EXISTING UTILITIES LOCATION AND ELEVATION AND DETERMINE BEST ROUTE OF NEW 8" WASTE BACKWASH.

PLOT CODE
 PEN-BLUE (0.08 INCHES (2.0mm))
 PEN-BLACK (0.08 INCHES (2.0mm))
 PEN-MAGENTA (0.08 INCHES (2.0mm))
 PEN-RED (0.08 INCHES (2.0mm))
 PEN-YELLOW (0.08 INCHES (2.0mm))
 PEN-CYAN (0.08 INCHES (2.0mm))
 PEN-GRAY (0.08 INCHES (2.0mm))
 PEN-DIM (0.08 INCHES (2.0mm))
 PEN-DASH (0.08 INCHES (2.0mm))
 PEN-DOT (0.08 INCHES (2.0mm))
 PEN-DASH-DOT (0.08 INCHES (2.0mm))
 PEN-THICK (0.08 INCHES (2.0mm))
 PEN-THIN (0.08 INCHES (2.0mm))
 PEN-ULTRA (0.08 INCHES (2.0mm))
 PEN-VERY (0.08 INCHES (2.0mm))
 PEN-SUPER (0.08 INCHES (2.0mm))
 PEN-HYPER (0.08 INCHES (2.0mm))
 PEN-ULTRA-HYPER (0.08 INCHES (2.0mm))
 PEN-THICK-DASH (0.08 INCHES (2.0mm))
 PEN-THIN-DASH (0.08 INCHES (2.0mm))
 PEN-ULTRA-DASH (0.08 INCHES (2.0mm))
 PEN-VERY-DASH (0.08 INCHES (2.0mm))
 PEN-SUPER-DASH (0.08 INCHES (2.0mm))
 PEN-HYPER-DASH (0.08 INCHES (2.0mm))
 PEN-ULTRA-HYPER-DASH (0.08 INCHES (2.0mm))

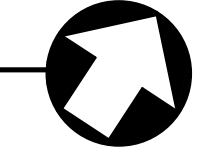
DATE	
REVISIONS	
NO.	



CONSTRUCTION NOTES

1 INSTALL STAINLESS STEEL HANDRAILING AND KICKPLATE. REUSE EXISTING STAINLESS STEEL HANDRAILING AND KICKPLATE THAT WAS REMOVED.

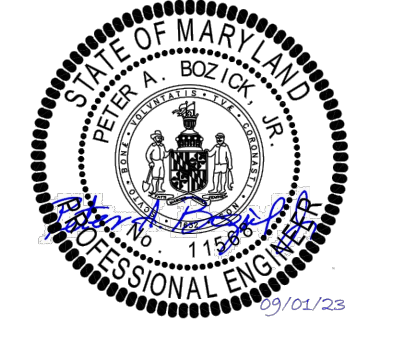
TOP PLAN
WASTEWATER BUILDING MODIFICATION PLAN
 SCALE: 1/4" = 1'-0"



PLOT CODE
 PEN-BLUE (1/16" INCHES (1.5mm))
 PEN-RED (1/16" INCHES (1.5mm))
 PEN-YELLOW (1/16" INCHES (1.5mm))
 PEN-ORANGE (1/16" INCHES (1.5mm))
 PEN-GREEN (1/16" INCHES (1.5mm))
 PEN-BLACK (1/16" INCHES (1.5mm))
 PLOT-SCALE (1/4" INCHES (6.35mm))

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 WORCESTER COUNTY, MARYLAND



**WASTEWATER
 BUILDING
 MODIFICATION
 TOP PLAN**

SCALE	AS SHOWN	SHEET NO.	Q-2.3
DESIGN BY	CBD		
DRAWN BY	MMD		
CHECKED BY	PAB		
GMB FILE	220047		
DATE	SEPTEMBER 2023		

DATE	
REVISIONS	
NO.	

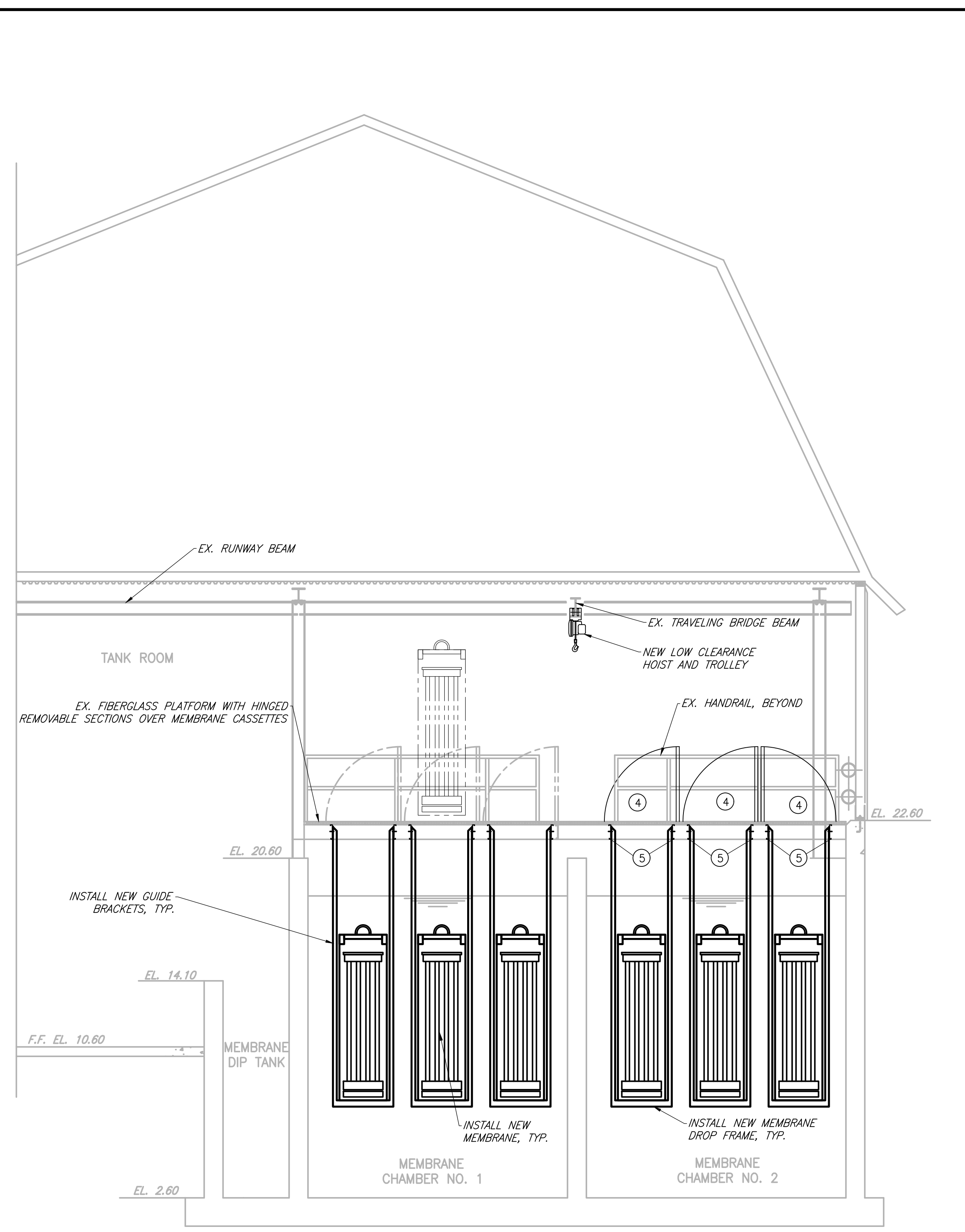
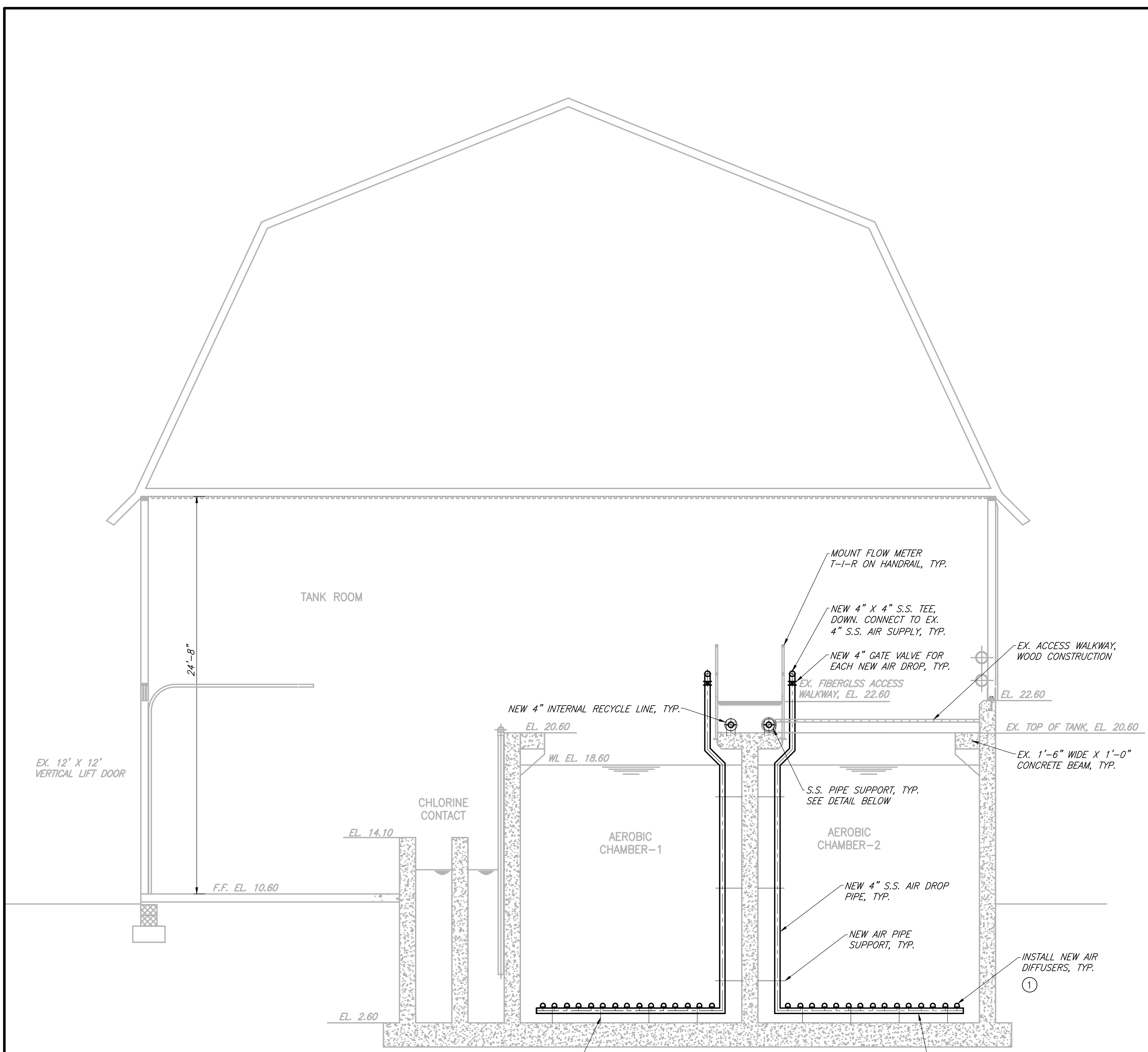
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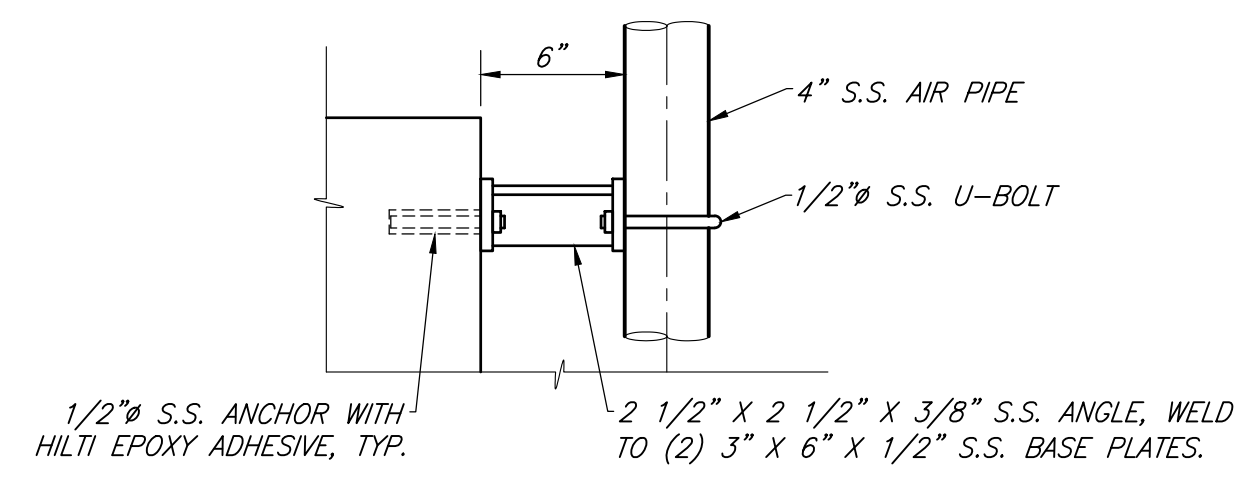
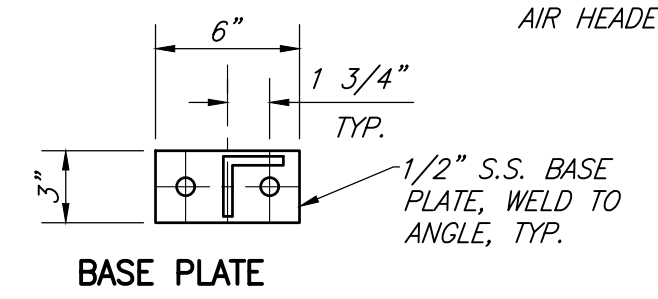
WASTEWATER
 BUILDING
 MODIFICATION
 SECTIONS A & B

SCALE	AS SHOWN	SHEET NO.
DESIGN BY	CBD	Q-2.4
DRAWN BY	MWD	
CHECKED BY	PAB	
GMB FILE	220047	
DATE	SEPTEMBER 2023	



NOTE:
 AIR SUPPLY AND PERMEATE
 HOSE CONNECTIONS NOT SHOWN

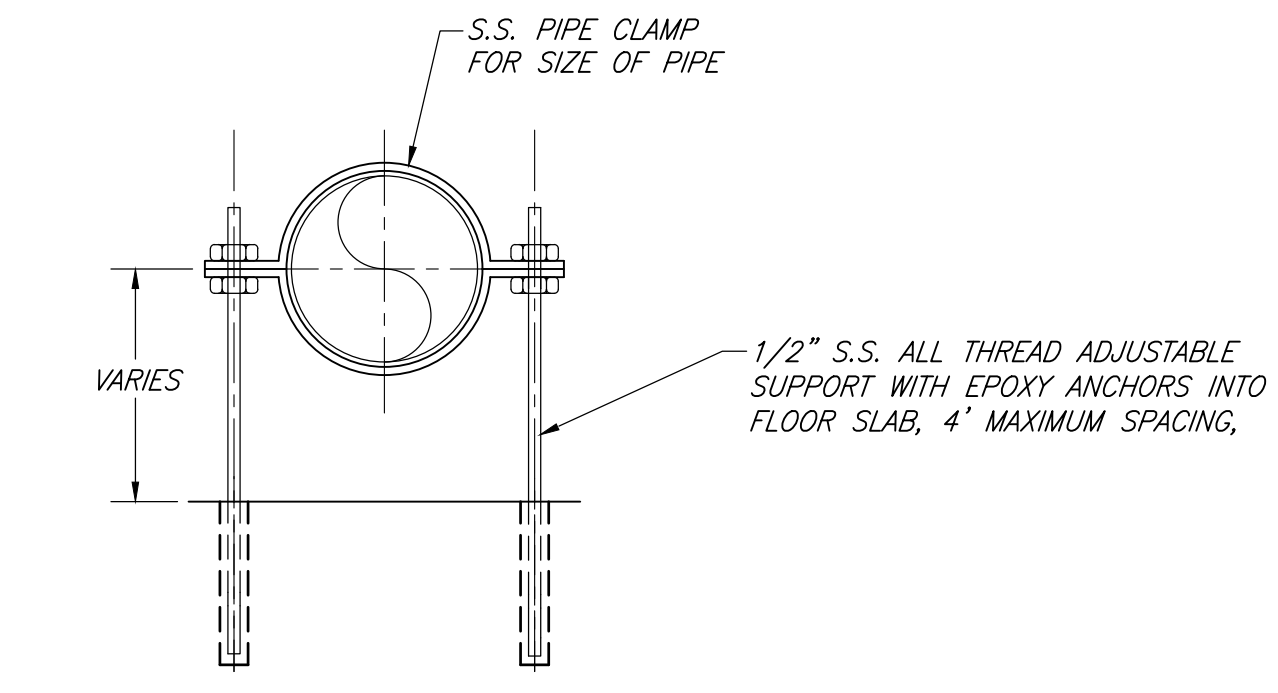
SECTION A
 SCALE: 1/4" = 1'-0" Q2.2



AIR PIPE SUPPORT
 SCALE: NONE

SECTION B
 SCALE: 1/4" = 1'-0" Q2.2

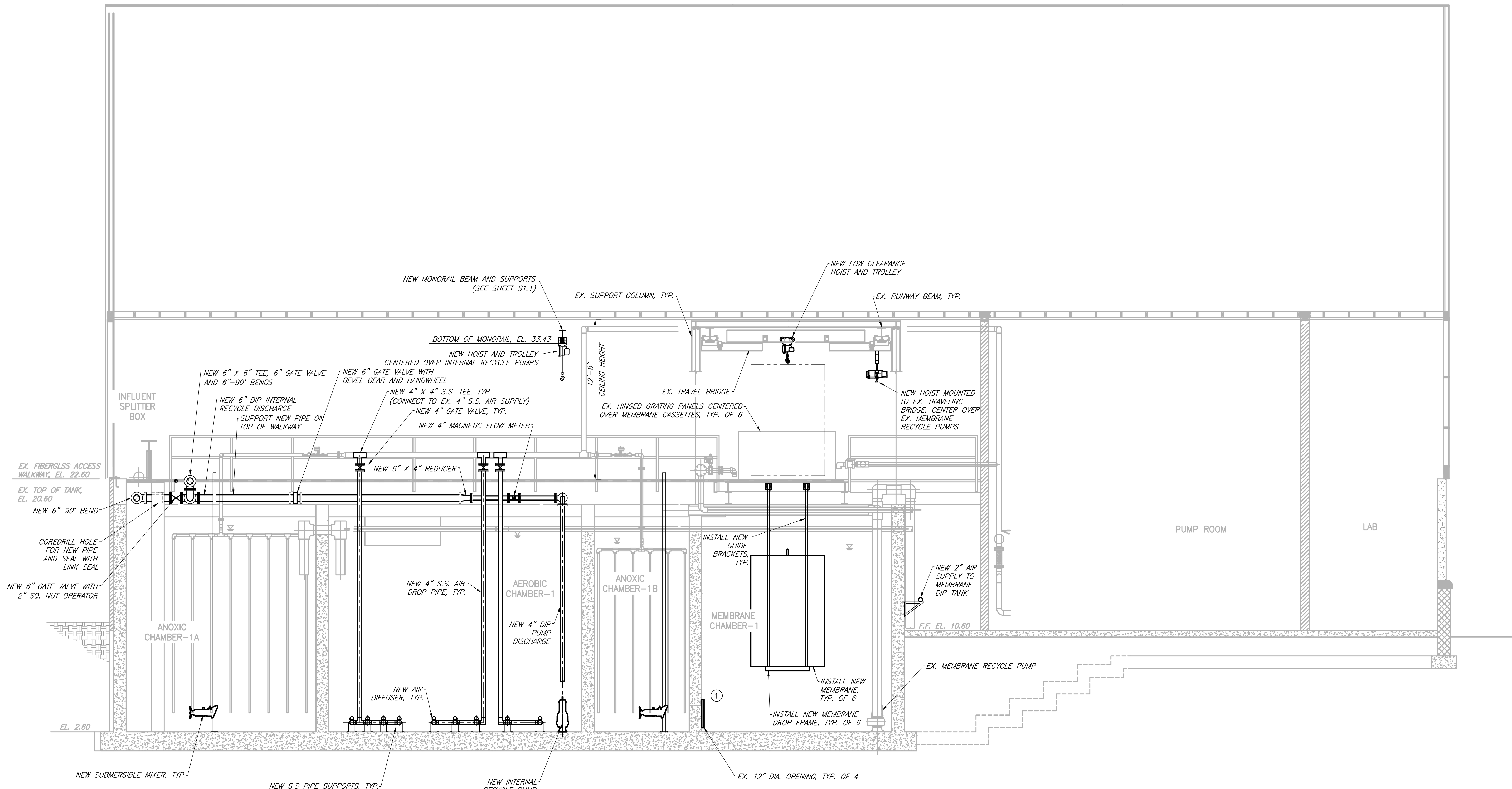
- CONSTRUCTION NOTES**
- AIR SUPPLY HEADER LAYOUT, NUMBER OF DIFFUSERS PER SYSTEM SUPPLIER.
 - ALL NEW FASTENING HARDWARE TO BE STAINLESS STEEL.
 - ALL ANCHORING BOLTS IN EXISTING CONCRETE TO BE EPOXY ANCHORS.
 - CONTRACTOR SHALL REMOVE AND REINSTALL EXISTING HINGED GRATING SECTIONS OVER MEMBRANE CASSETTES TO THE ORIENTATION AS SHOWN.
 - CONTRACTOR SHALL REMOVE AND REINSTALL EXISTING GRATING SUPPORT FRAMING AROUND HINGED GRATING SECTIONS TO ACCOMMODATE NEW MEMBRANE CASSETTES AS REQUIRED.



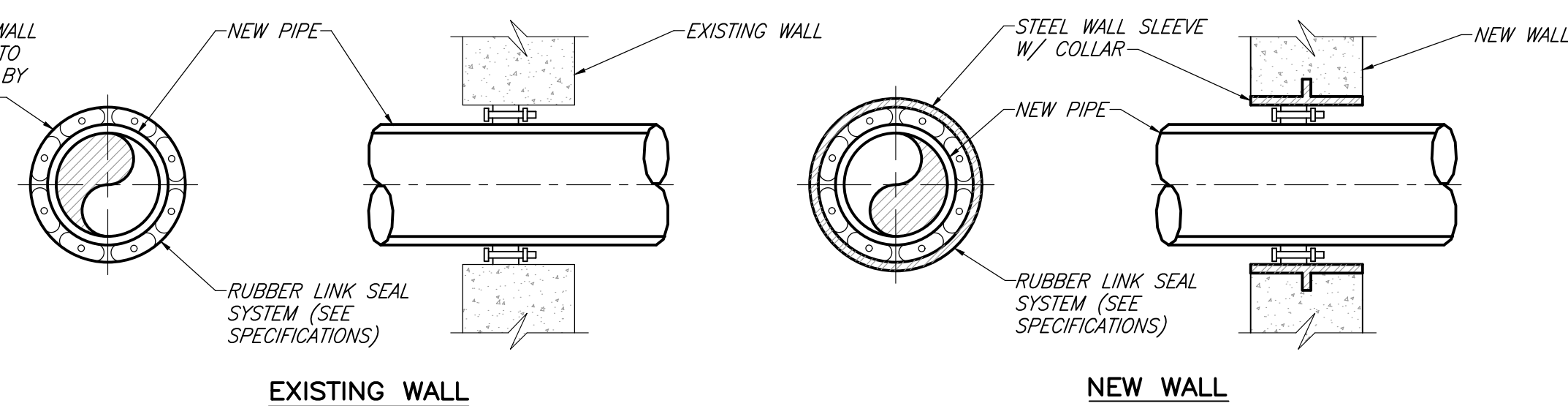
ADJUSTABLE S.S. PIPE SUPPORT
 NOT TO SCALE

PLOT CODE: PENN-BLUE (200 INCHES (50mm)), PENN-ORANGE (200 INCHES (50mm)), PENN-YELLOW (200 INCHES (50mm)), PENN-RED (200 INCHES (50mm))

DATE	
REVISIONS	
NO.	

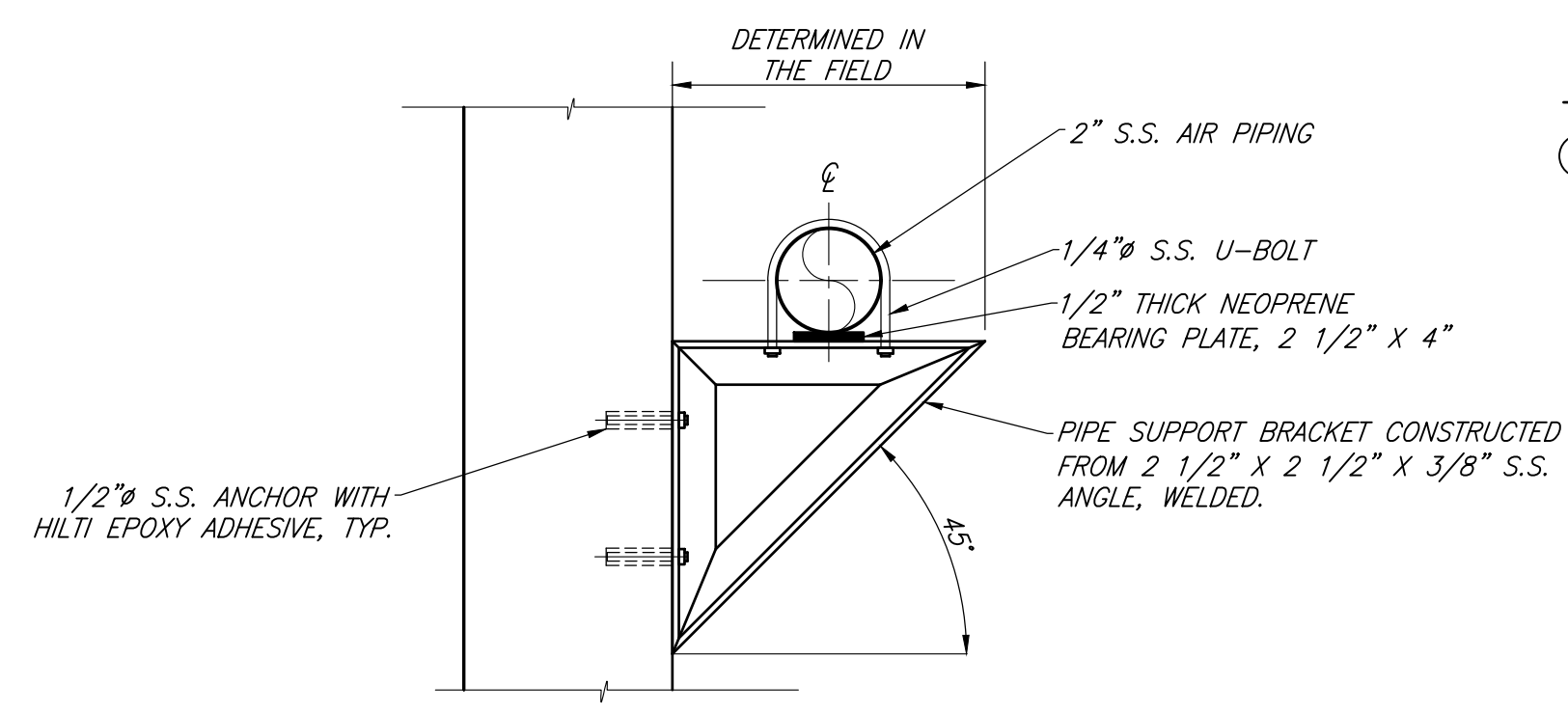


SECTION C
SCALE: 1/4" = 1'-0"



PIPE THROUGH WALL
NOT TO SCALE

NOTE: SUPPORT PIPE ON BOTH SIDES OF LINK SEAL.



DETAIL - AIR PIPE SUPPORT
SCALE: NONE

CONSTRUCTION NOTES

- ① SEAL EXISTING OPENING IN EX. WALL WITH 1/2" THICK STAINLESS STEEL PLATE, SIZE TO BE 6" LARGER ALL AROUND. ATTACH TO WALL WITH S.S. EPOXY ANCHORS, 6" O.C. ON 4 SIDES. CALK BETWEEN WALL AND PLATE.

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WASTEWATER
BUILDING
MODIFICATION
SECTION C

SCALE : AS SHOWN	SHEET NO.
DESIGN BY : CBD	Q-2.5
DRAWN BY : MMD	
CHECKED BY : PAB	
GMB FILE : 220047	
DATE : SEPTEMBER 2023	

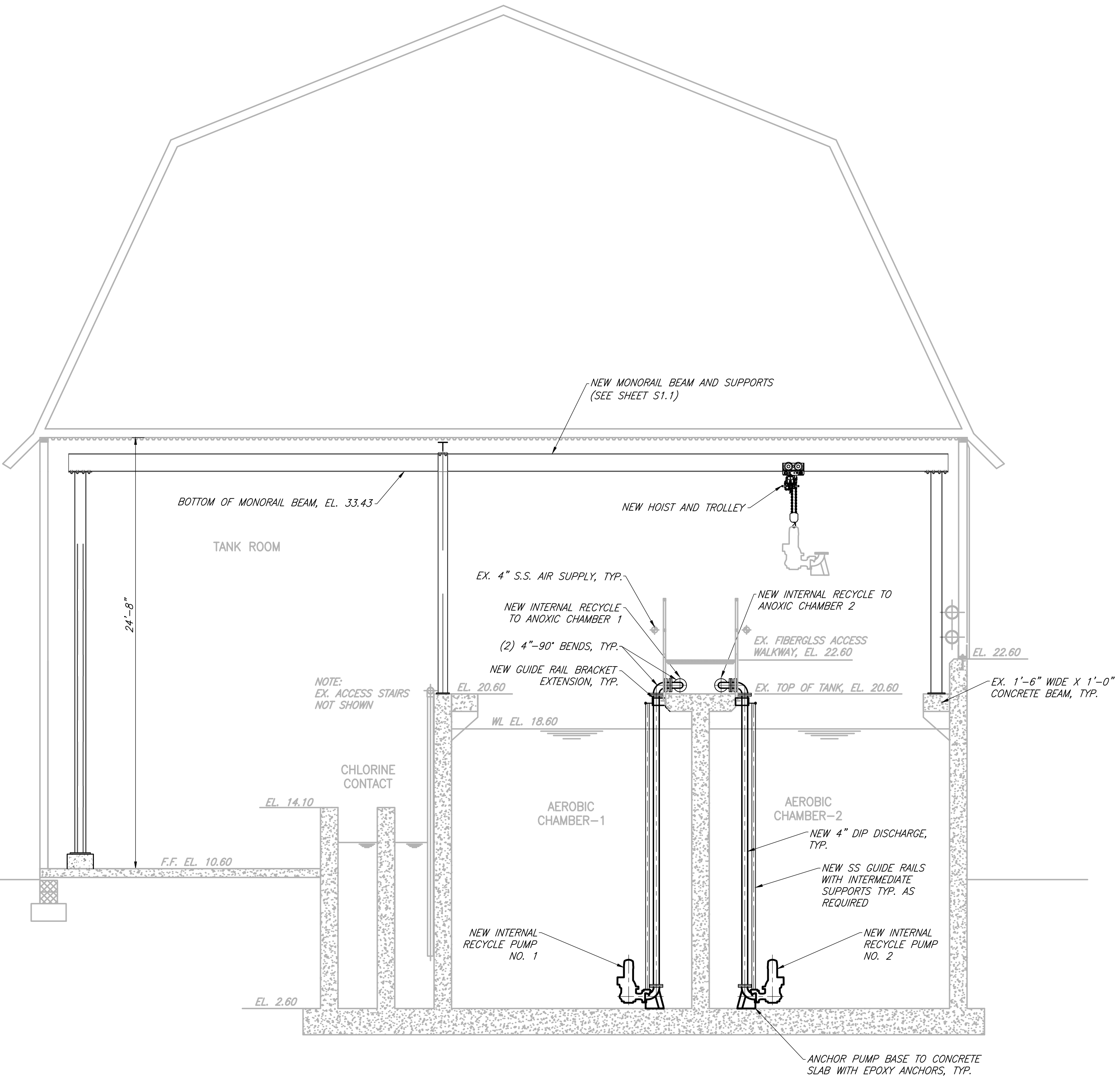
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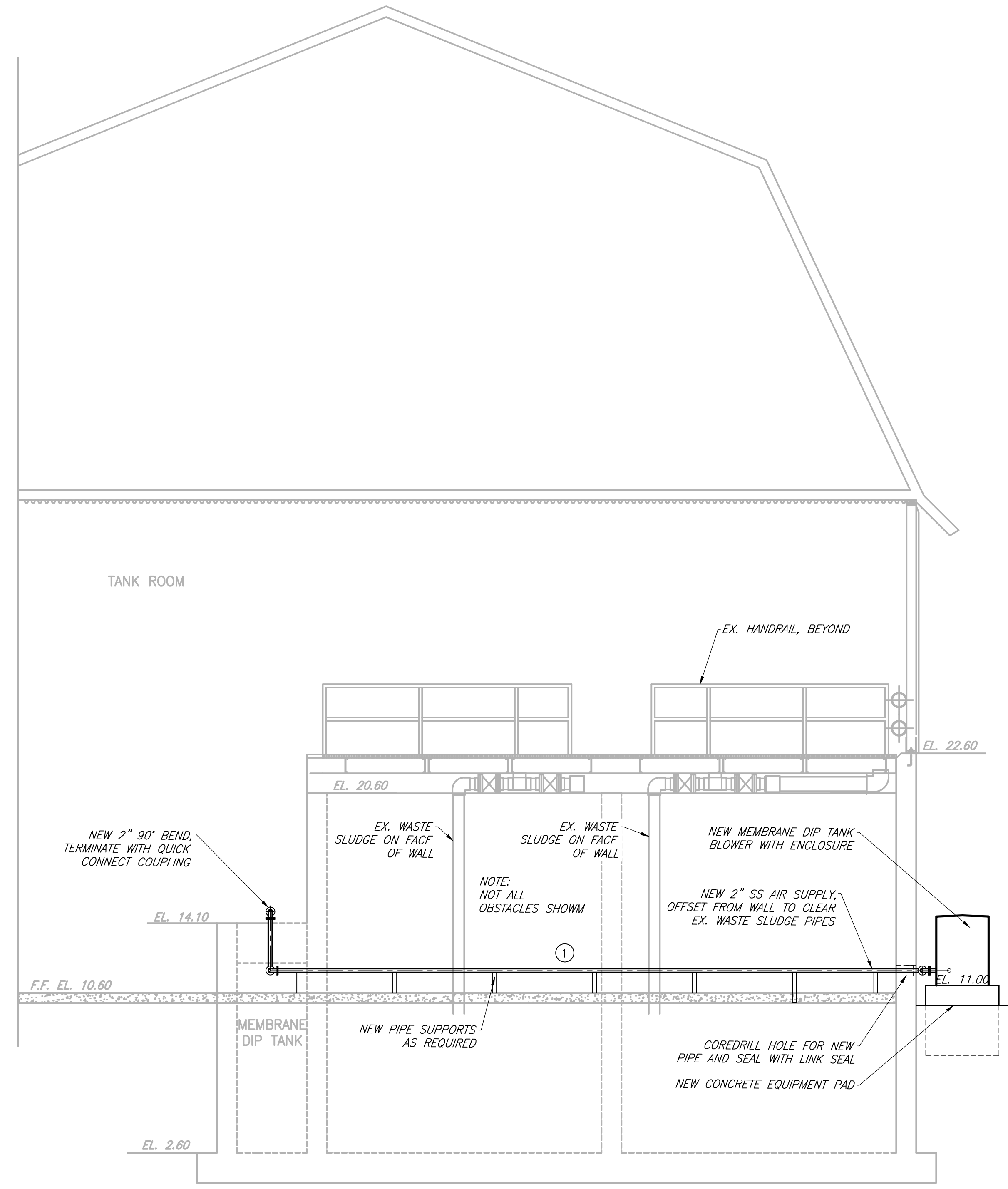


WASTEWATER
 BUILDING
 MODIFICATION
 SECTIONS D & E

SCALE	AS SHOWN	SHEET NO.
DESIGN BY	CBD	Q-2.6
DRAWN BY	MWD	
CHECKED BY	PAB	
GMB FILE	220047	
DATE	SEPTEMBER 2023	



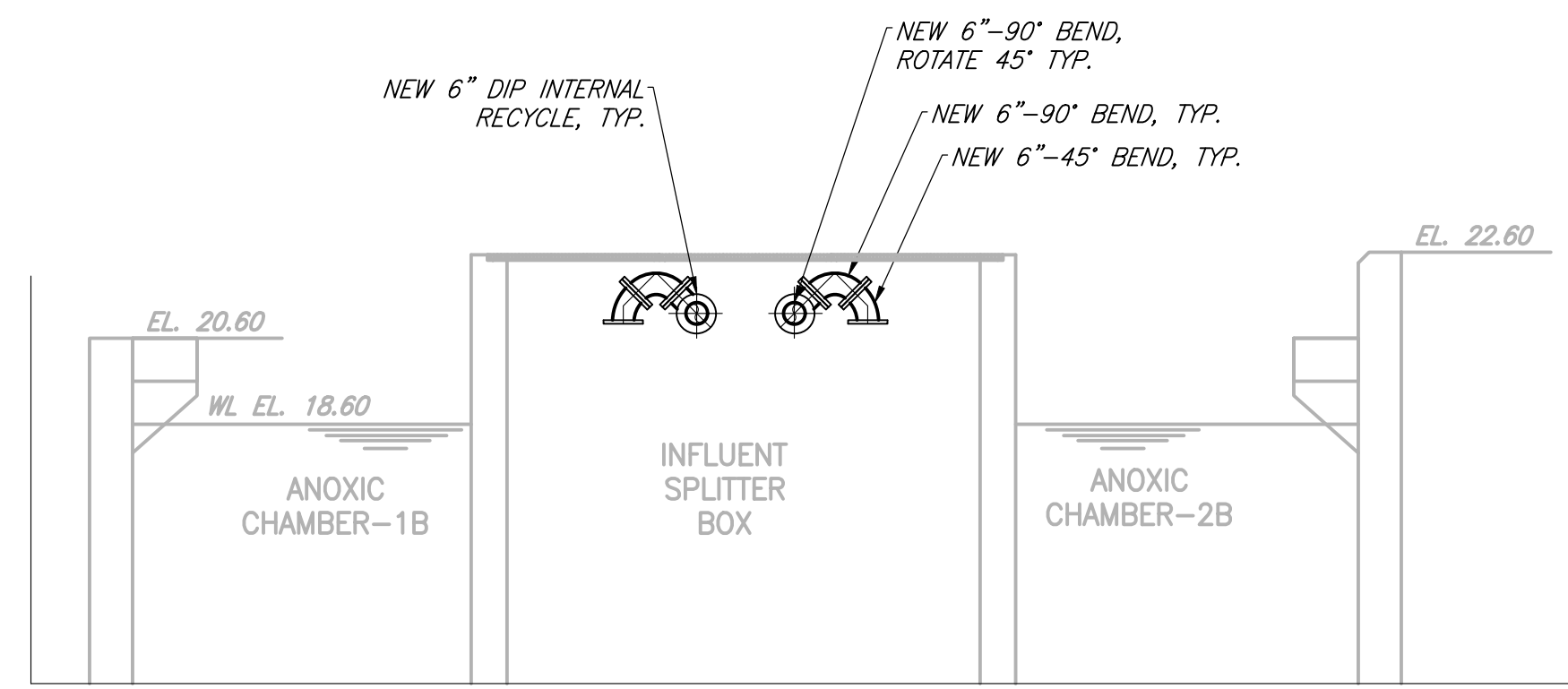
SECTION D
 SCALE: 1/4" = 1'-0" Q2.2



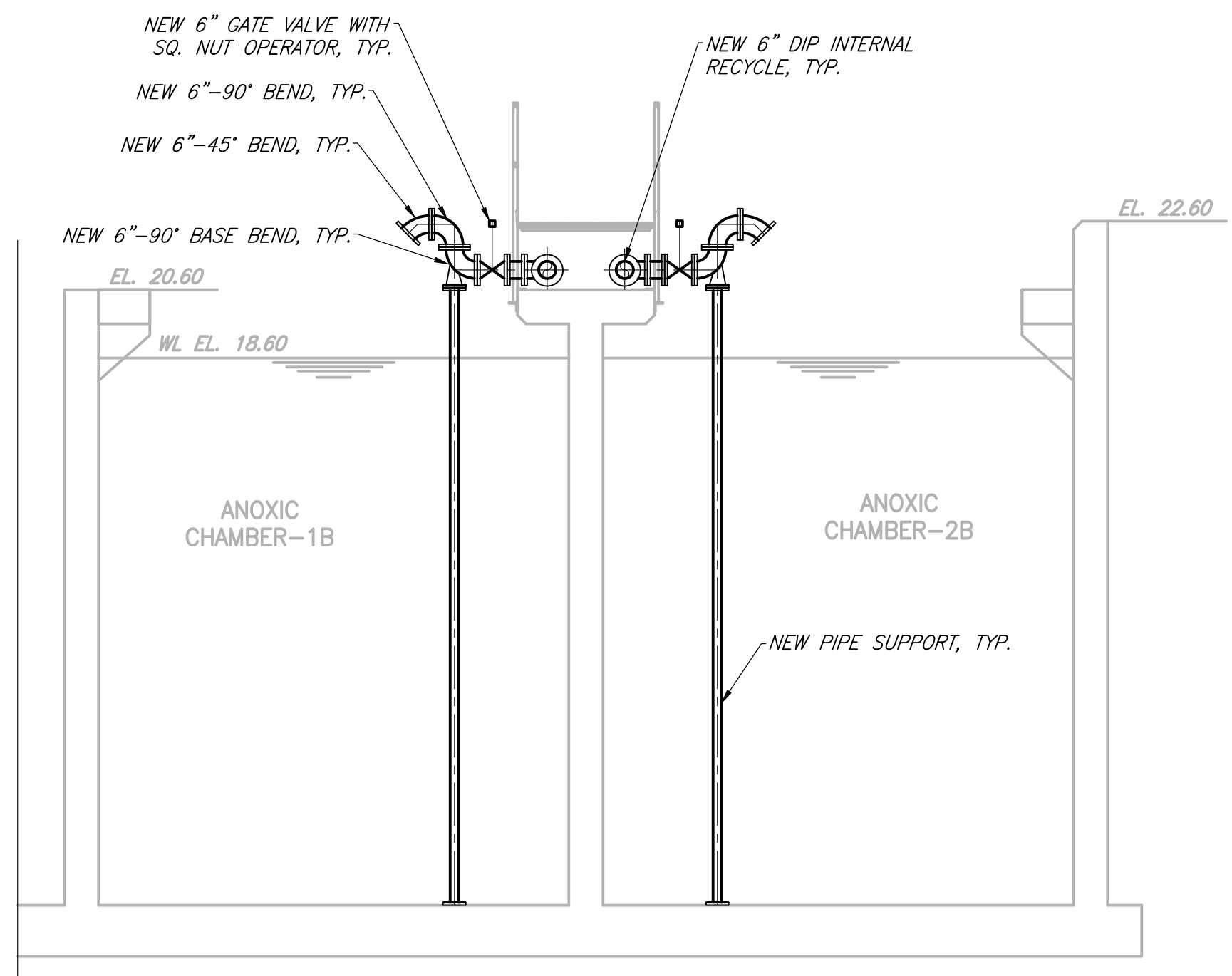
SECTION E
 SCALE: 1/4" = 1'-0" Q2.2

- CONSTRUCTION NOTES**
- 1 CONTRACTOR SHALL ROUTE NEW AIR PIPING AS NEEDED TO AVOID CONFLICTS WITH EXISTING PIPES.

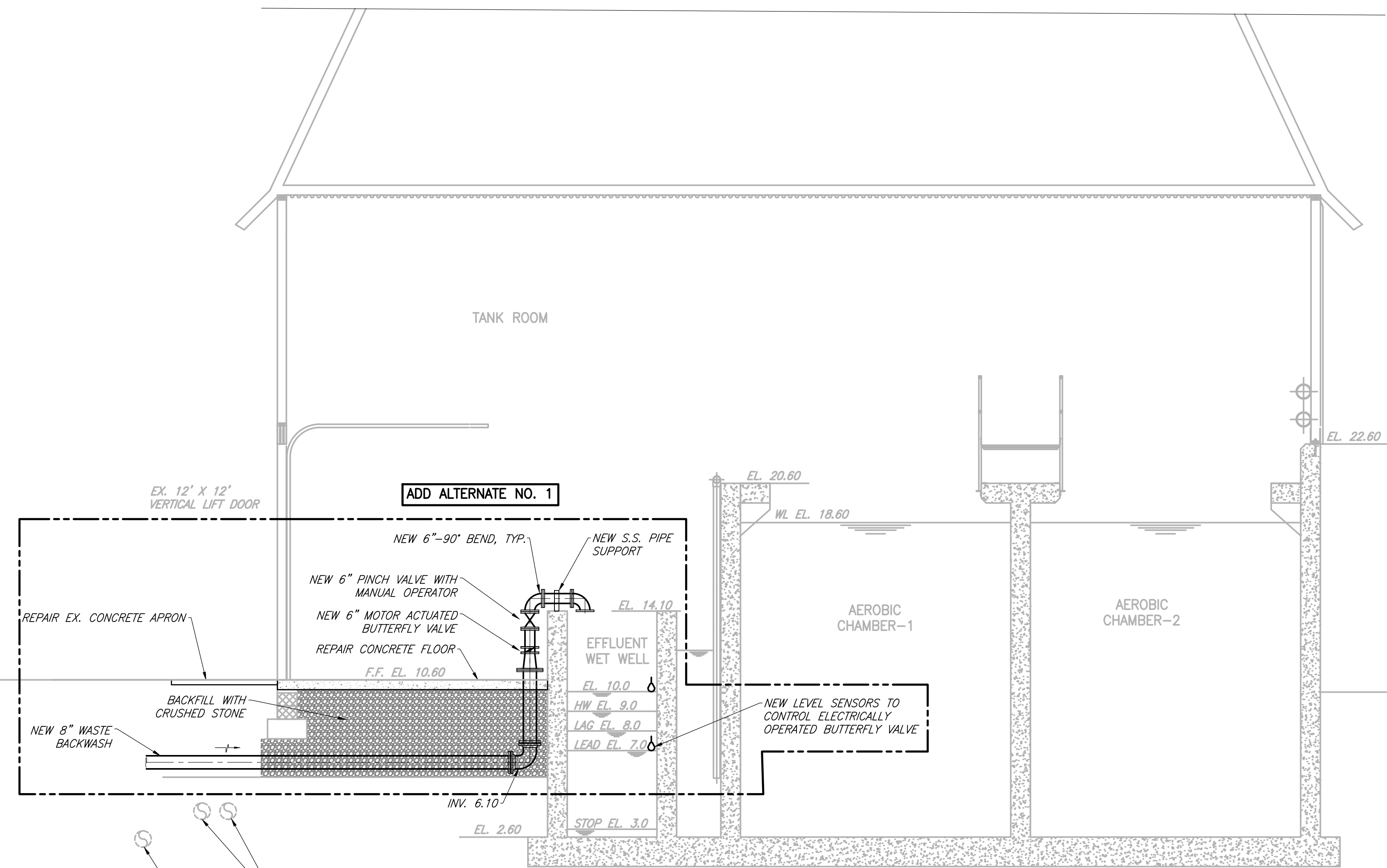
PLOT CODE
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 PEN-YELLOW (0.07 INCHES (1.8mm))
 PEN-RED (0.08 INCHES (2.0mm))
 PEN-ORANGE (0.10 INCHES (2.5mm))
 PEN-GREEN (0.12 INCHES (3.0mm))
 PEN-MAGENTA (0.17 INCHES (4.3mm))
 PEN-BLACK (0.30 INCHES (7.6mm))
 PEN-WHITE (0.37 INCHES (9.4mm))



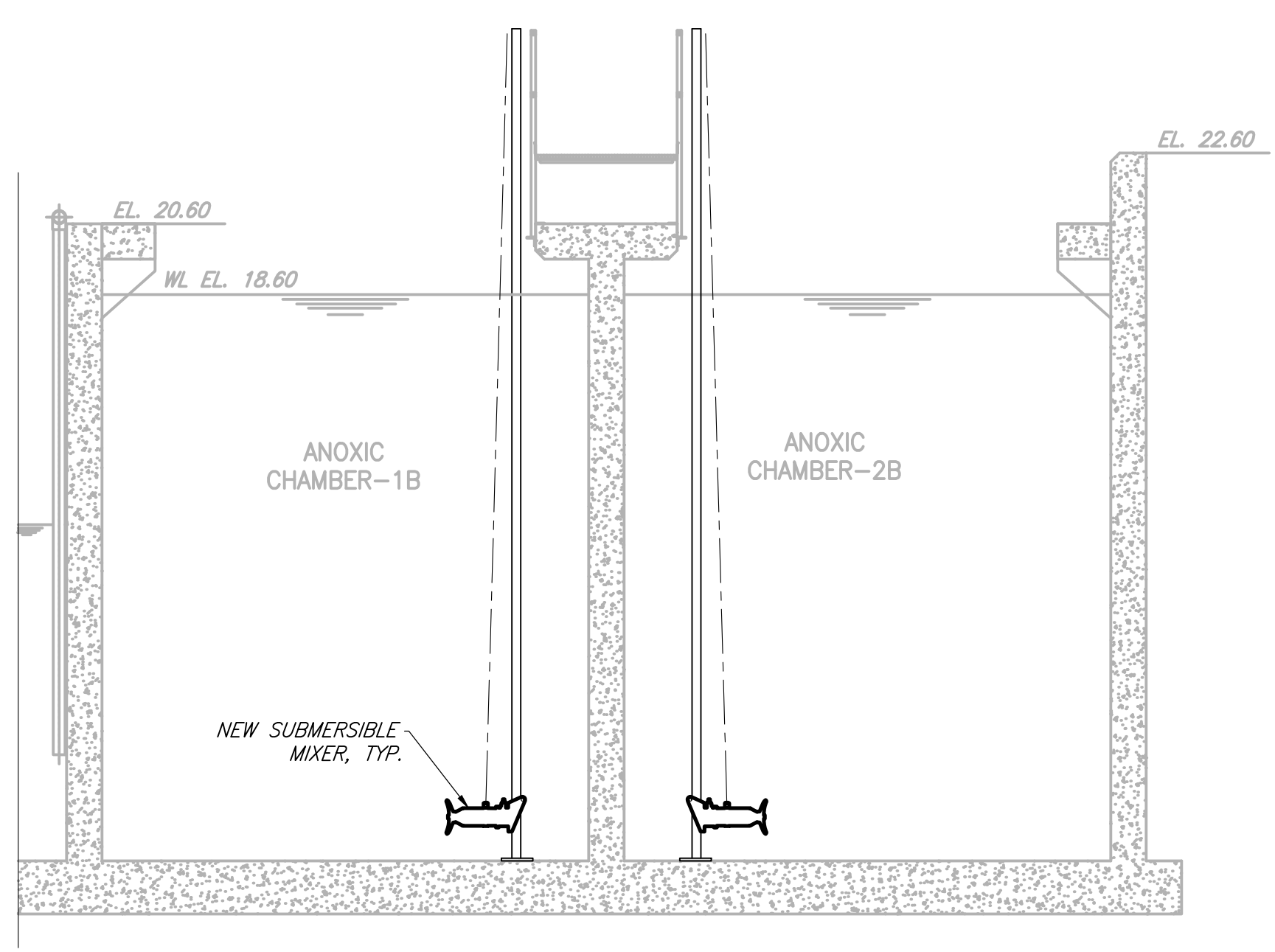
SECTION I
SCALE: 1/4" = 1'-0" Q2.2



SECTION H
SCALE: 1/4" = 1'-0" Q2.2



SECTION F
SCALE: 1/4" = 1'-0" Q2.2



SECTION G
SCALE: 1/4" = 1'-0" Q2.2

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DATE
REVISIONS
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WASTEWATER
 BUILDING
 MODIFICATION
 SECTIONS F

SCALE: AS SHOWN	SHEET NO.
DESIGN BY: CBD	Q-2.7
DRAWN BY: MWD	
CHECKED BY: PAB	
GMB FILE: 220047	
DATE: SEPTEMBER 2023	

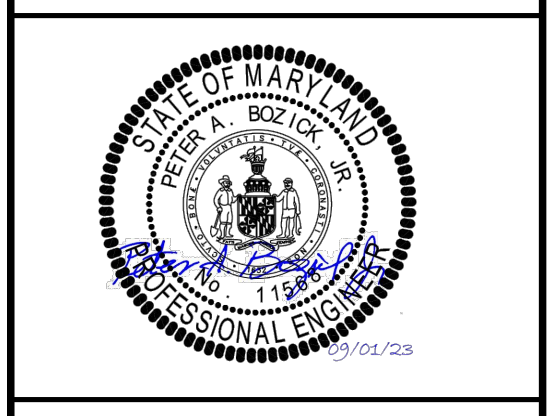
PLOT CODE
 PEN=RED (0.08 INCHES (2.0mm))
 PEN=YELLOW (0.07 INCHES (1.8mm))
 PEN=TEAL (0.07 INCHES (1.8mm))
 PEN=GREEN (0.10 INCHES (2.5mm))
 PEN=BLUE (0.10 INCHES (2.5mm))
 PEN=BLACK (0.27 INCHES (7.0mm))
 PEN=WHITE (0.39 INCHES (10.0mm))

DATE	
REVISIONS	
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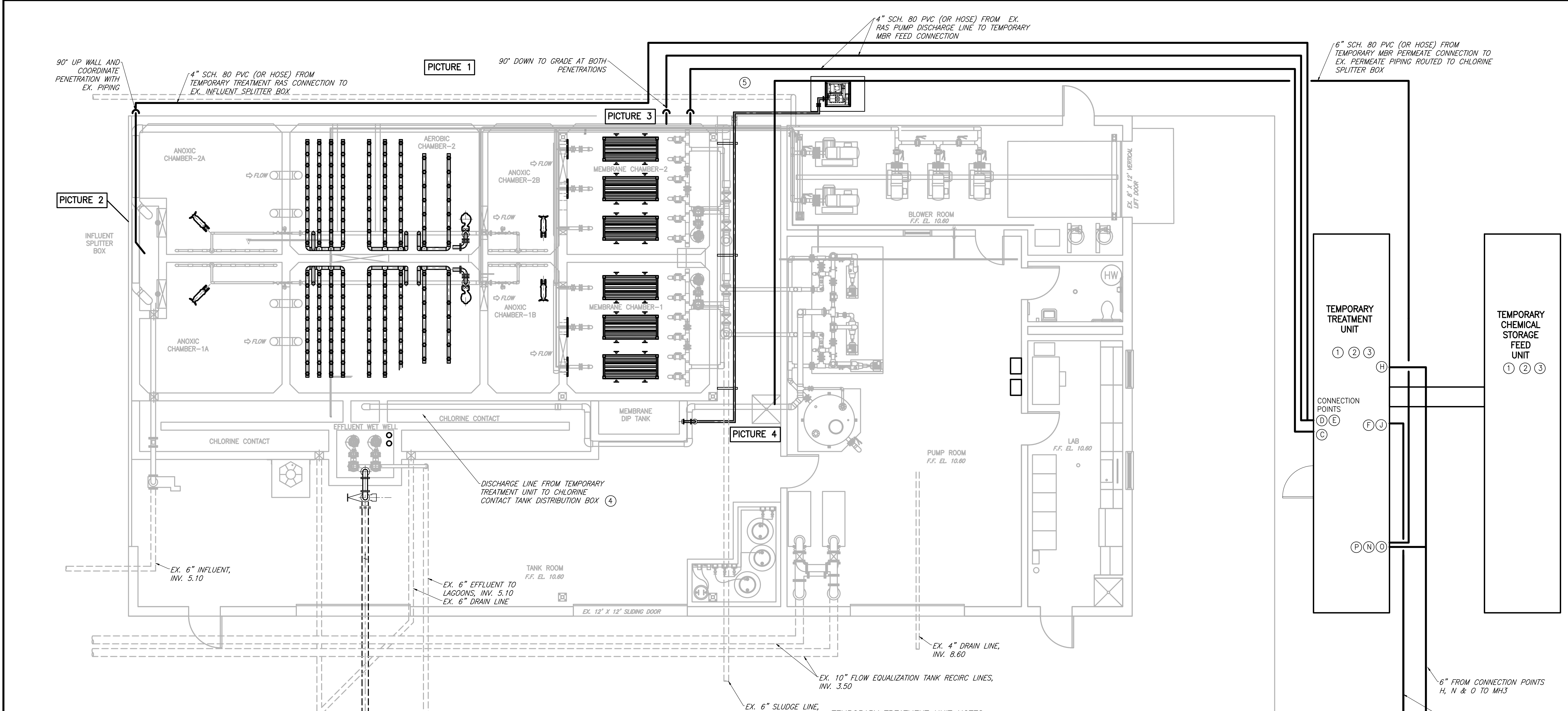
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TEMPORARY TREATMENT UNIT PLAN

SCALE	AS SHOWN	SHEET NO.	
DESIGN BY	CBG		
DRAWN BY	MMD		
CHECKED BY	PAB		
GMB FILE	220047		
DATE	SEPTEMBER 2023		

Q-2.8



PICTURE 1

4" RAS FROM CONNECTION E TO SPLITTER BOX
 4" FEED TO CONNECTION C & D FROM EX. RAS PUMPS
 6" PERMEATE TO EX. PERMEATE DISCHARGE FEED TO CHLORINE CONTACT SPLITTER BOX. REDUCE TO 4" PRIOR TO ENTRY INTO BUILDING.

PICTURE 2

4" SCH. 80 PVC (OR HOSE) FROM TEMPORARY TREATMENT RAS CONNECTION TO EX. INFLUENT SPLITTER BOX

PICTURE 3

4" BUTTERFLY VALVE, TYP.
 8" X 4" TEE, TURN AT 45°; 4"-45° BEND TYP.

PICTURE 4

CONNECT TEMPORARY PERMEATE LINE TO EX. PIPING WITH ISOLATION VALVES. CONTRACTOR TO COORDINATE WITH EXISTING PIPING TO REMAIN IN SERVICE.

DATE	
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NO.	

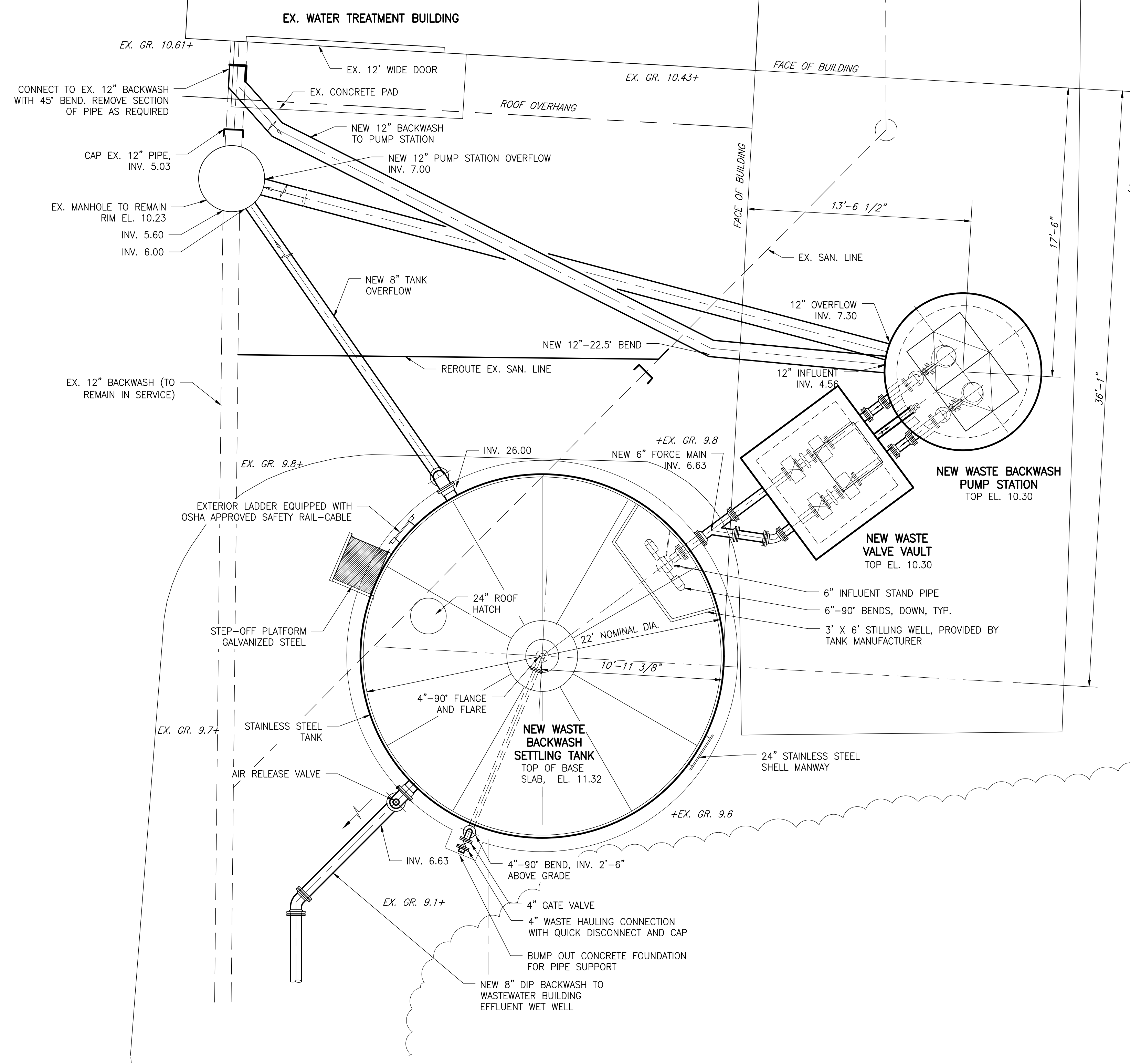
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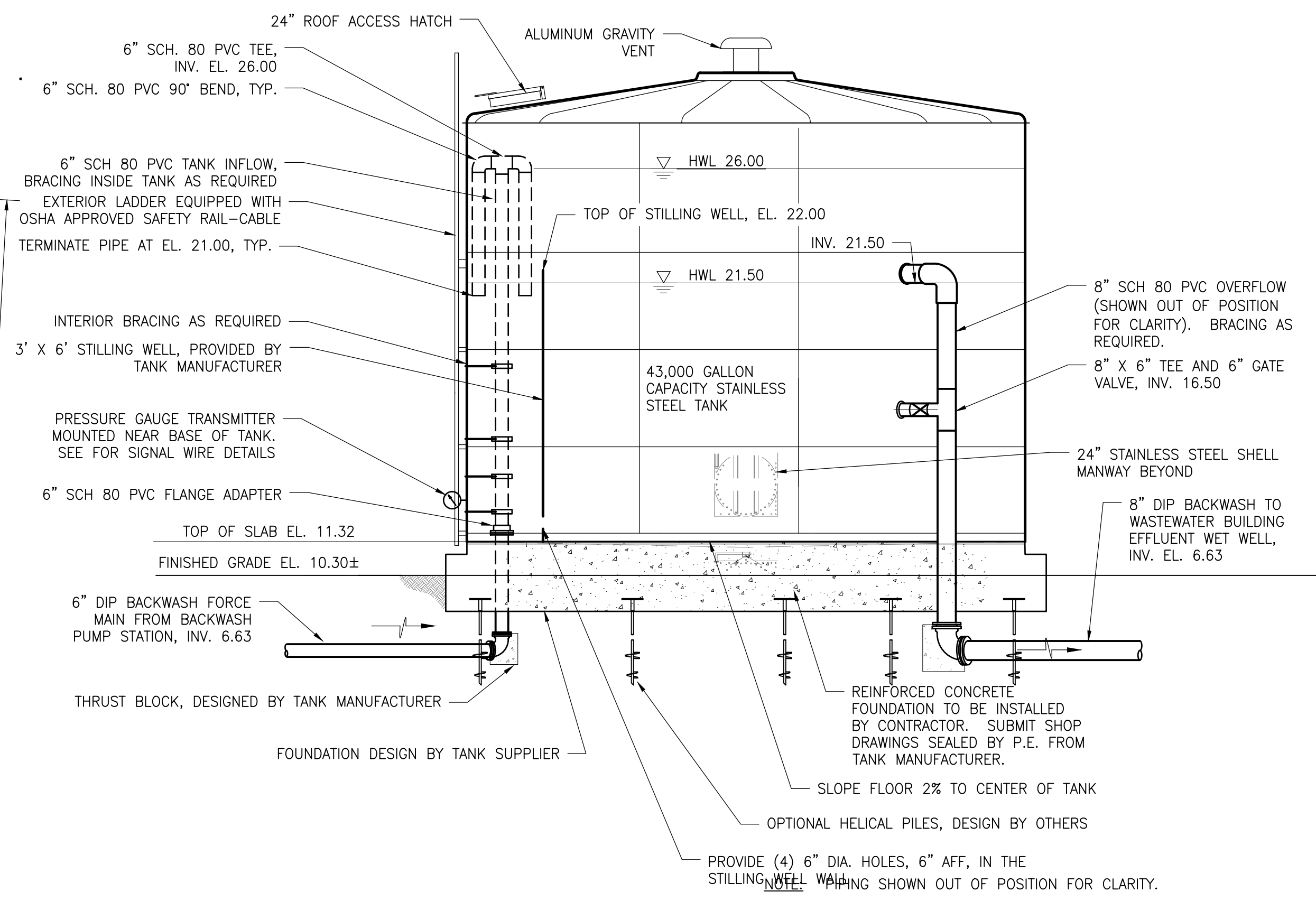
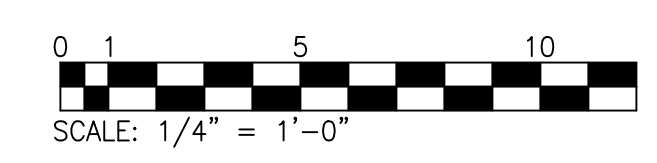


**WASTE BACKWASH
 SETTLING TANK**

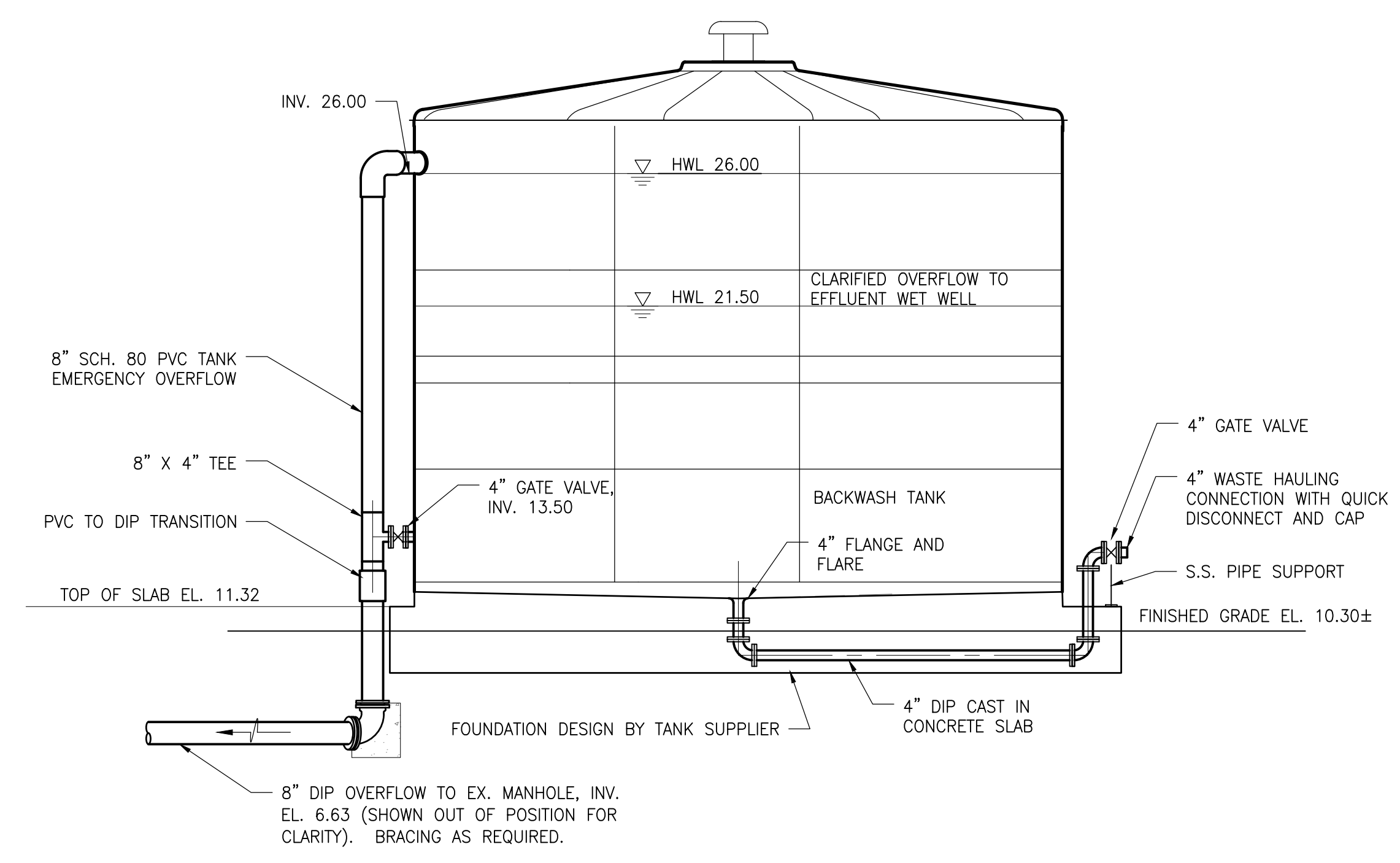
SCALE: AS SHOWN	SHEET NO.
DESIGN BY: CBD	Q-3.0
DRAWN BY: MMD	
CHECKED BY: PAB	
GMB FILE: 220047	
DATE: SEPTEMBER 2023	



WASTE BACKWASH SETTLING TANK
 SCALE: 1/4" = 1'-0"



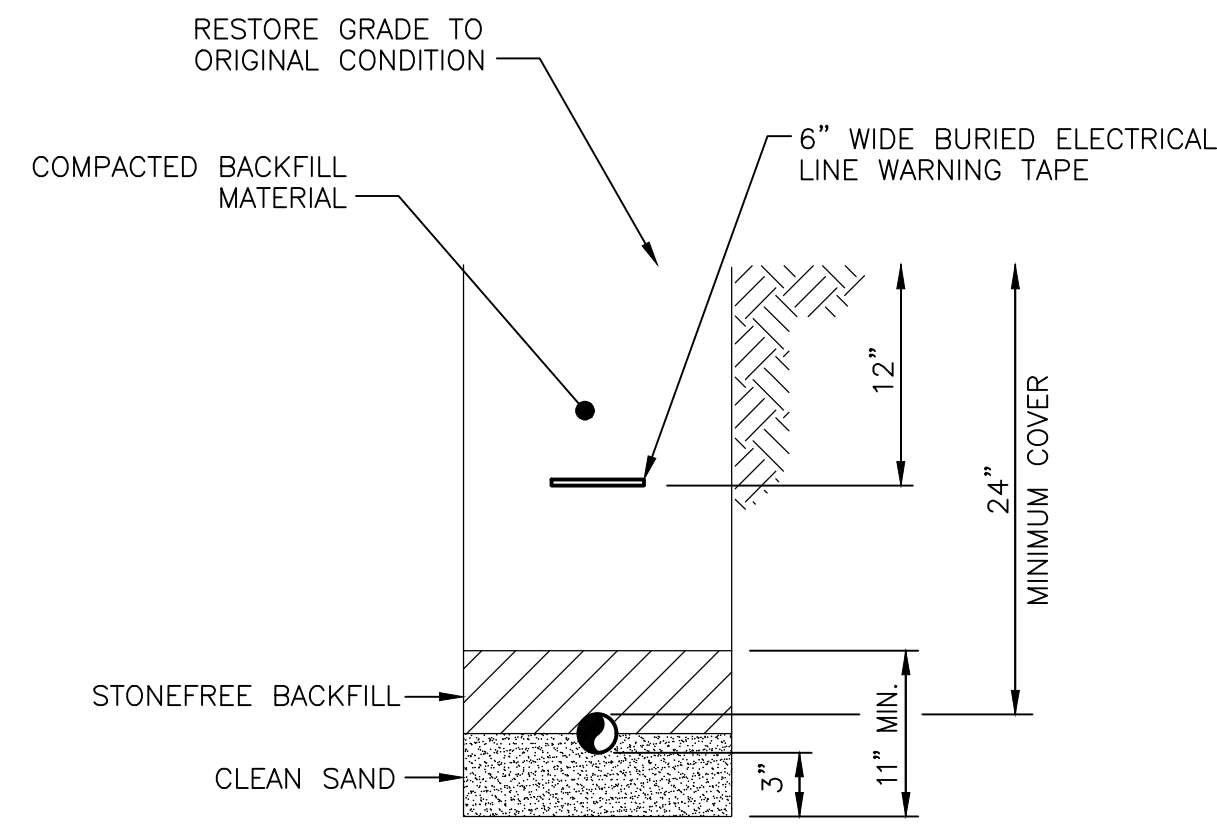
ELEVATION
 SCALE: 1/4" = 1'-0"



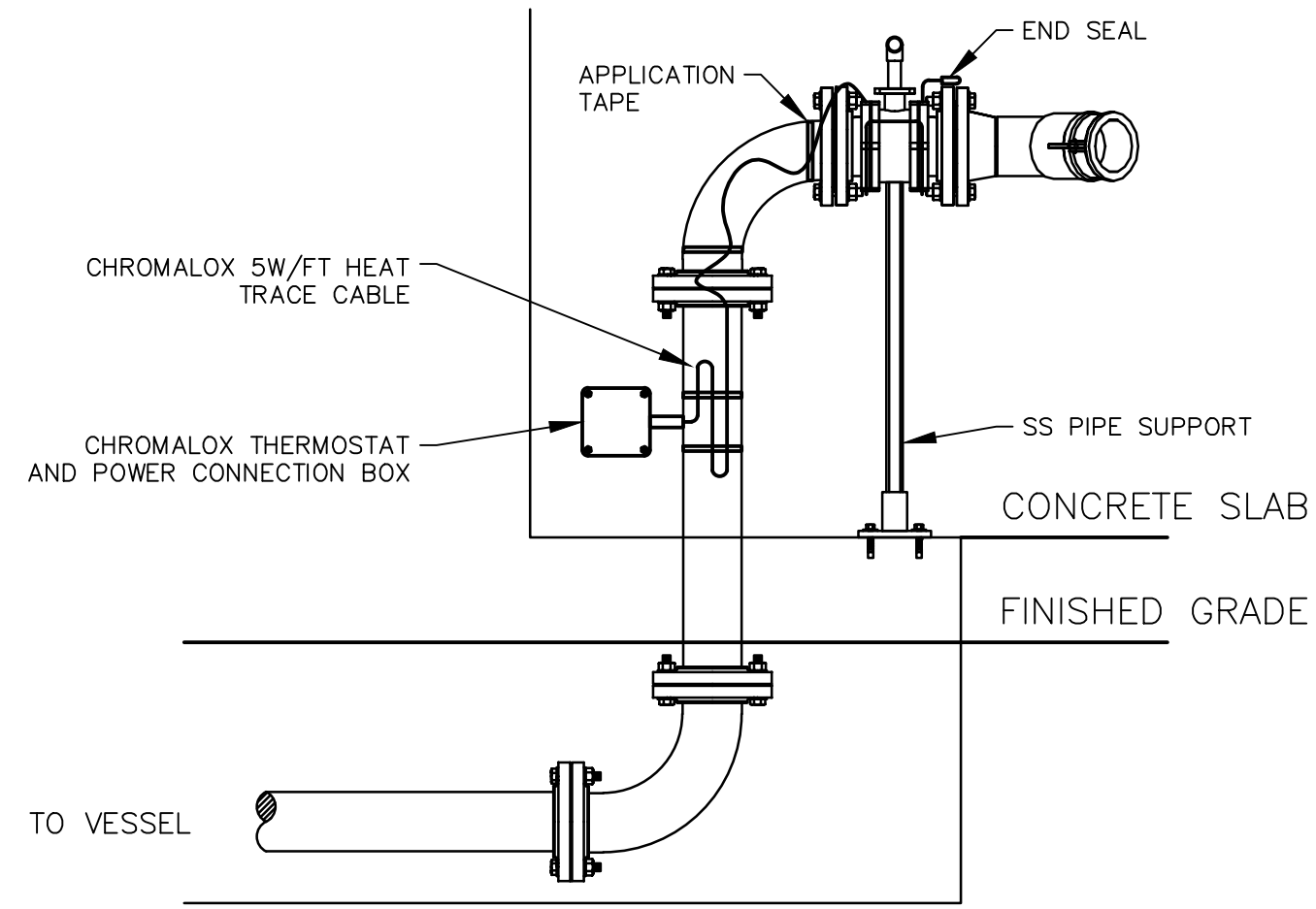
ELEVATION
 SCALE: 1/4" = 1'-0"

ADD ALTERNATE NO. 1

PLOT CODE: PEN-YELLOW (207 INCHES (53mm)), PEN-RED (207 INCHES (53mm)), PEN-YELLOW (207 INCHES (53mm)), PEN-RED (207 INCHES (53mm)), PEN-YELLOW (207 INCHES (53mm)), PEN-RED (207 INCHES (53mm)), PEN-YELLOW (207 INCHES (53mm)), PEN-RED (207 INCHES (53mm)), PEN-YELLOW (207 INCHES (53mm)), PEN-RED (207 INCHES (53mm))



DIRECT BURIED – ELECTRICAL – DETAIL
SCALE: NTS

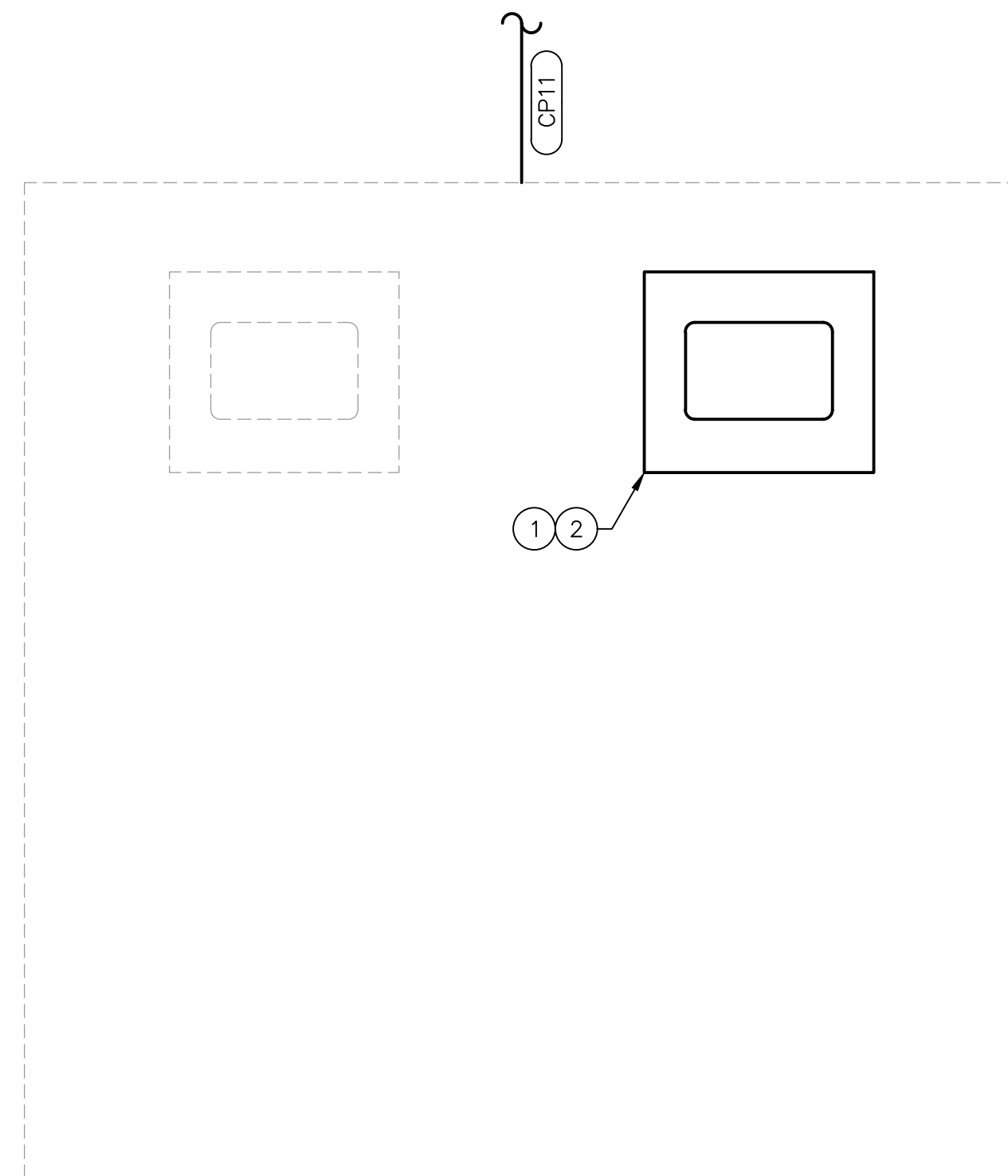


- NOTES:
1. PROVIDE CHROMALOX HEAT TRACING CABLE WITH THERMOSTAT AND POWER CONNECTION BOX.
 2. INSTALL HEAT TRACE CABLING PER MANUFACTURER'S INSTRUCTIONS.

HEAT TRACING – ELECTRICAL – DETAIL
SCALE: NTS

MAIN LUG	WELL PMP #1 STR	EFFLU PMP #1 STR
WTR TOW	SUBTROLS WELL PMP 1&2	EFFLU PMP #2 STR
HP PANEL C.B.	WELL PMP #2 STR	EFFLU PMP #3 STR
SPACE		PMP CTRL PANEL
SPACE	WWTP C.B.	SPACE
SPACE		SPACE

WTP MCC



- NOTES:
1. CUT PANEL DOOR PENETRATION TO SERVE NEW OIT.
 2. PROVIDE NEW OIT TO DISPLAY MBR CONTROL PANEL DATA.
 3. DEDICATED CATSE CABLE. NO COMMUNICATIONS WITH EXISTING EQUIPMENT IN THIS PANEL.
 4. USE POWER SOURCE IN CABINET TO SERVE NEW OIT.

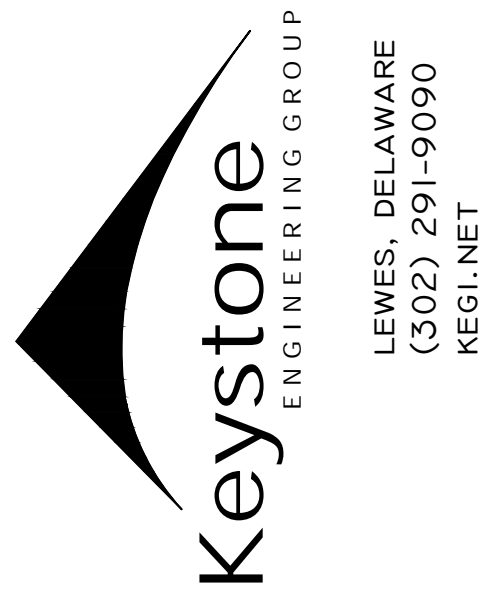
EXISTING WWTP – SCADA PANEL – DETAIL
SCALE: NTS

HP C.B.	PROC. BLWR #1 C.B.	COMP. #1 STR	PERM. PMP #1	RECIRC. PMP #1		
SPACE	PROC. BLWR #2 C.B.	COMP. #2 STR	PERM. PMP #2	RECIRC. PMP #2	INFLU. PMP #1 VFD	INFLU. PMP #2 VFD
BLANK	MIXER 1A	F.E. RECIRC F.F. #1	PERM. PMP #3	IRP #1 IRP #2		
MAIN C.B.	MEM BLWR #1 STR	F.E. RECIRC F.F. #2	SCR. BUILD. C.B.	DIP TANK BLR	LINE R. INFLU PMP #1	LINE R. INFLU PMP #2
	MEM BLWR #3 STR	EFFLU PMP #1		MIXER 2A		
	MEM BLWR #2 STR	EFFLU PMP #1	SPACE	MOBILE TRAILER	MIXER 1B	MIXER 2B
			EFF. PMP RESET			

WWTP MCC

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RIDDLE FARM WWTP
EQUIPMENT UPGRADES

WORCESTER COUNTY, MARYLAND

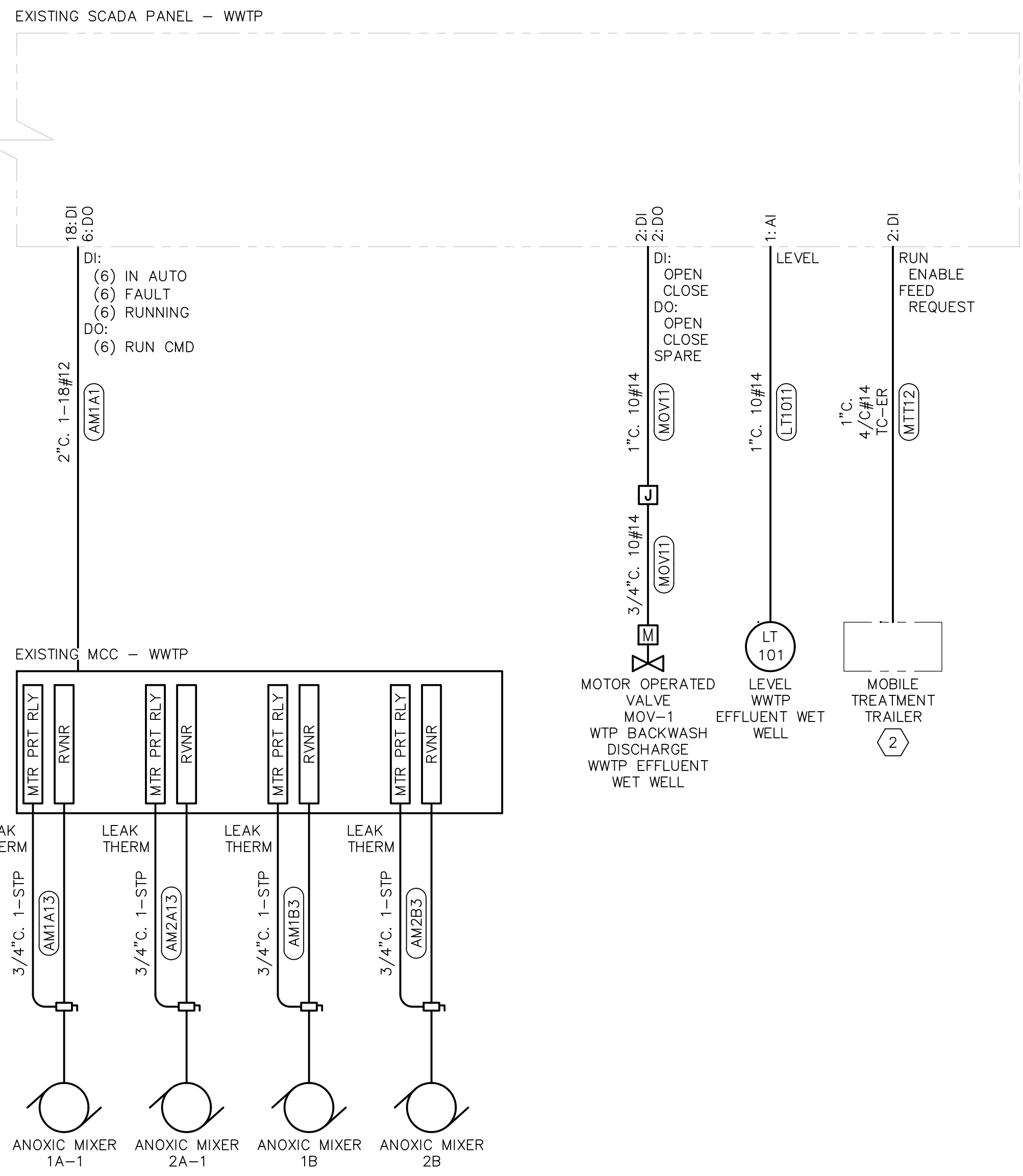
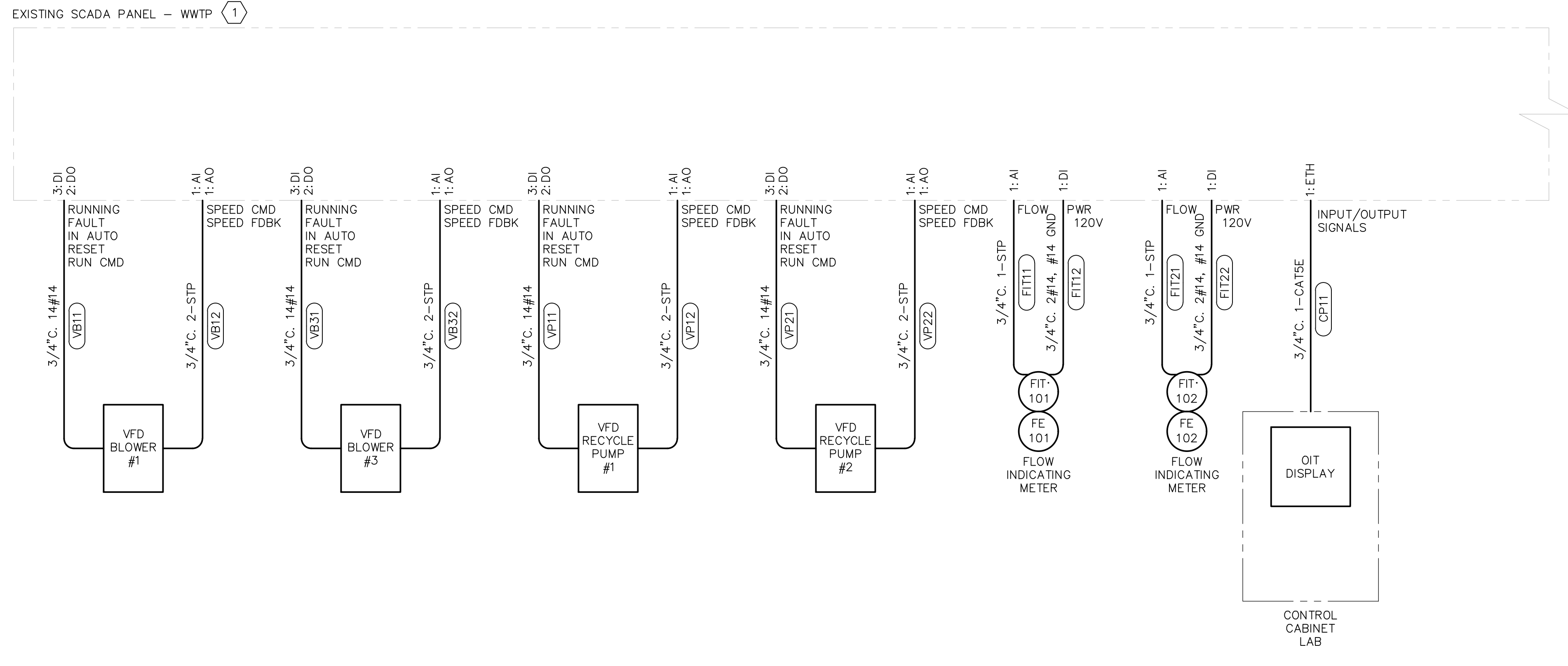
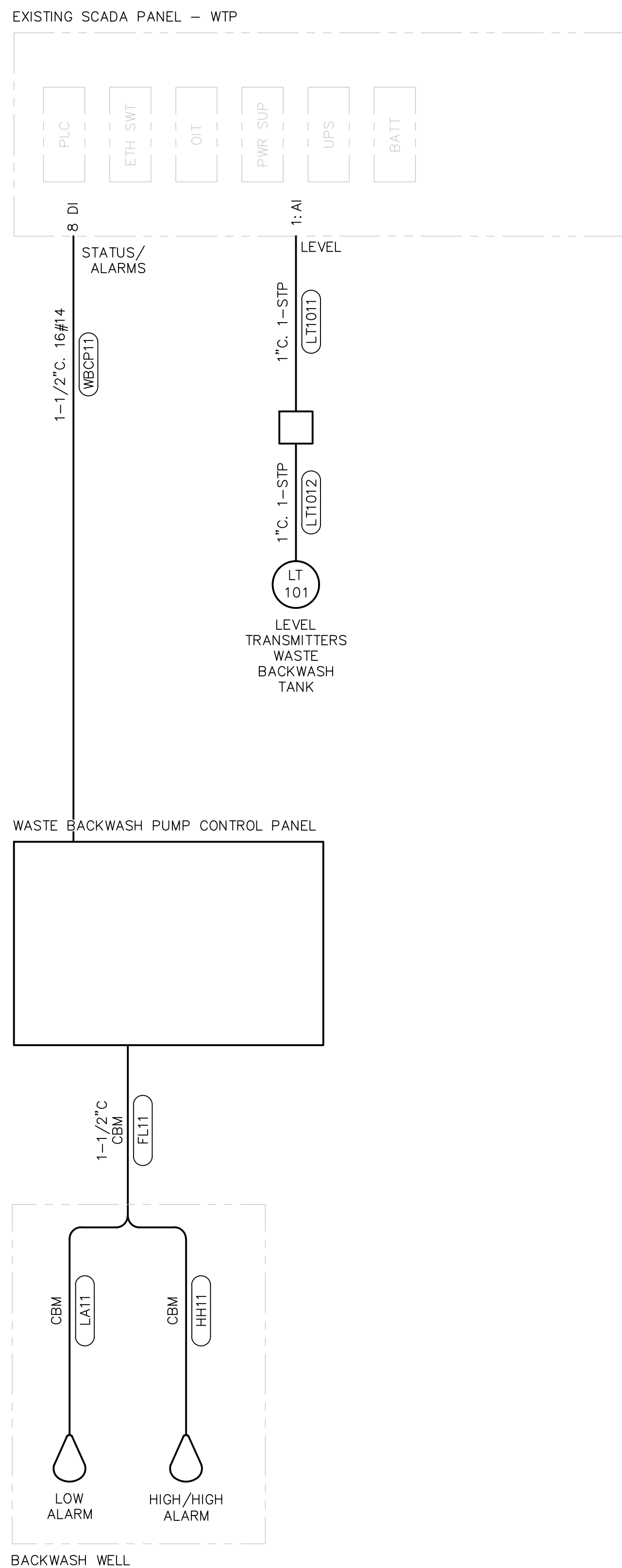
DETAILS -
ELECTRICAL

SCALE : AS NOTED	SHEET NO.
DESIGN BY : CLJ	E-5
DRAWN BY : CAD	
CHECKED BY : CLJ	
GMB FILE : 220047	
DATE : AUGUST 2023	

THIS DRAWING IS ISSUED FOR
PERMITTING

PLOT CODE
PLOT SIZE
PLOT SCALE
PLOT COLOR
PLOT LINE
PLOT FONT

PEN-RED : 3/16 INCHES (15mm)
 PEN-YELLOW : 3/16 INCHES (15mm)
 PEN-GREEN : 3/16 INCHES (15mm)
 PEN-BLUE : 3/16 INCHES (15mm)
 PEN-MAGENTA : 3/16 INCHES (15mm)
 PEN-WHITE : 3/16 INCHES (15mm)



- KEYNOTES:**
1. INSTALL VEOLIA SUPPLIED EQUIPMENT IN EXISTING CONTROL PANEL.
 2. TEMPORARY CABLING TO SERVE MOBILE TREATMENT TRAILER.

INTERCONNECT DIAGRAM

THIS DRAWING IS ISSUED FOR
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RIDDLE FARM WWTP EQUIPMENT UPGRADES WORCESTER COUNTY, MARYLAND	
INTERCONNECT DIAGRAM - ELECTRICAL	
SCALE : AS NOTED	SHEET NO.
DESIGN BY : CLJ	E-8
DRAWN BY : CAD	
CHECKED BY : CLJ	
GMB FILE : 220047	
DATE : AUGUST 2023	

